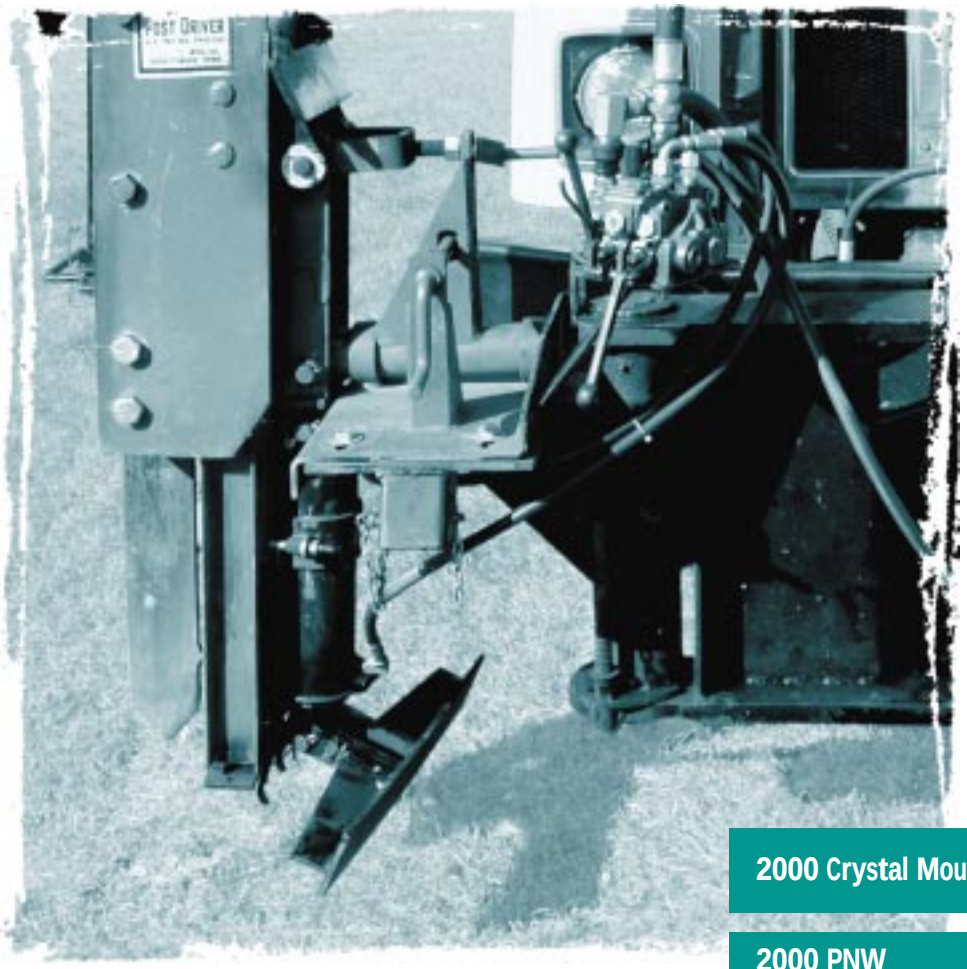
WST2

Washington State Technology Transfer



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Issue 68, Fall 2000

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by WSDOT Highways & Local Programs Service Center
Washington State Technology Transfer Center
310 Maple Park Ave. SE
PO Box 47390
Olympia, WA 98504-7390

e-mail: wst2center@wsdot.wa.gov
Home Page: www.wsdot.wa.gov / TA / T2Center / T2hp.htm

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Include both old label and new address, please.

Contents

From the Editor's Desk

Welcome to *Washington State Technology Transfer*, formerly the *T2 Bulletin*. We've outgrown our old format, so, as you see, we've designed a whole new look and feel, and come up with a new name as well. As our new name implies, the purpose of this *WST2* is to bring you the latest in technology emerging from research, entering the marketplace and developed by Washington State transportation agencies themselves. Our goal is to have you walk away with practical information that you can apply after reading each issue.

I'd like to thank Laura Walker, our former newsletter designer, for the tremendous job she has done over the past two years. Her professionalism showed itself in each issue. Her timeliness, positive attitude and patience have been greatly appreciated. Laura has taken on new challenges as she embarks upon a new position outside of state service. We miss her warm smile. We in the WST2 Center wish her the very best in her new position.

I'd also like to welcome Jennie Throckmorton to the newsletter team as our new designer. Jennie courageously stepped in to replace Laura just as we were beginning a major overhaul of the newsletter. Jennie has done an exceptional job in taking the newsletter to a new level. She has put in long hours to create our new look and add the finishing touches to the *WST2*. Clearly, her extra efforts show. We appreciate her excellent design savvy and enthusiasm, and look forward to working with her.

While I'm at it, I'd also like to announce that Wendy Schmidt, WST2 Assistant, is now our *WST2* Assistant Editor. Wendy has played a big part in keeping the production going in my absence, researching information, and providing valuable input in the redesign process.

We hope you find this edition interesting and informative. We welcome your comments on what you like or want to see changed. Please contact us and let us know what you think. Got an idea for an article or have a need for information in a certain area? Let us know. We'll do what we can to help you.

Dan

Secretary of Transportation
Sid Morrison

Assistant Secretary, H&LP
Paula Hammond, PE

Director of Technology Transfer
Dan Sunde, PE

Publication Editor
Dan Sunde, PE

Assistant Editor
Wendy Schmidt

Graphic Design
Jennie Throckmorton

Staff Writers
Bob Brooks
Roger Chappell
Laurel Gray
Dave Sorensen

The Local Technical Assistance Program (LTAP) is a national program financed by the Federal Highway Administration (FHWA) and individual state transportation departments. Administered through Technology Transfer (T2) Centers in each state, LTAP bridges the gap between research and practice by translating state-of-the-art technology into practical application for use by local agency transportation personnel.
Any opinions, findings, conclusions or recommendations presented in this newsletter are those of the authors and do not necessarily reflect the views of WSDOT or FHWA. All references to proprietary items in this publication are not endorsements of any company or product.

DELINEATOR POST PUNCH

WINS 2000 CRYSTAL MOUSE AWARD!

By: Dan Sunde, Director WST2

Roy Gilliam, Lead Tech, and Maintenance Techs Joel F. Havlina and Jim Crownover from Area 3 in WSDOT South Central Region demonstrated the first Crystal Mouse Award winner at the Pacific Northwest Transportation Technology Expo 2000. The men presented a Delineator Post Punch built by Errol Rhode and Jimmye Crawford that is the result of a desire to improve the safety and efficiency of doing a job. Expo attendees voted it the best innovation by a public agency. The WSDOT South Central Region Team received the award from Paula Hammond, Assistant Secretary for Highways & Local Programs Service Center, and Dan Sunde, Director of the Washington State Technology Transfer Center, on December 7.

The Crystal Mouse Award is sponsored by the WST2 Center and Washington Partnerships for Quality Transportation (WPQT) to acknowledge creative ideas that promote work efficiency, cost reduction, and improvements in transportation quality.

The resulting labor-saving piece of equipment reduces injuries, saves time, and increases productivity.

So, how did this invention come to be? Ten years ago in the South Central Region, delineators were driven by hand. It was slow, backbreaking work that resulted in low productivity and many crew members developing back strain. Tom Root, Maintenance Supervisor for the East Selah Area at the time, noticed workers in a vineyard driving posts with a machine mounted on a tractor. He bought one and used it for installing delineators, but the device, center-mounted on a tractor with a 3-point hitch, had drawbacks. The holes were not vertical, as one tractor wheel was usually in the ditch. Mechanics Don Remily and Howard Ocobock of WSDOT South Central Region worked up an I-beam mount for the post punch on the front of a dump truck that used the truck's hydraulics as a carrier of the post driver as it moved to the left and right. Their original invention is still in use.

Errol Rhode and Jimmye Crawford, mechanics in the WSDOT South Central Region Yakima Maintenance Shop, improved the mounting attachment to WSDOT'S dump trucks. The ingenious duo designed a double knuckle boom to replace the original three-point I beam mounting assembly. This mechanism allows it to swing on a center point pivot on a

Opposite page: A close-up view of Errol Rhode's and Jimmye Crawford's award winning Delineator Post Punch.

To left: Jim Crownover demonstrates the post punch to a very interested crowd. The Delineator Post Punch drew a lot of attention during the 3-day event.

standard snowplow frame. The punch can swivel from the left side of the truck to the right side, greatly improving its usability. They then tied the hydraulic system of the punch into the snowplow's hydraulic system.

The resulting labor-saving piece of equipment reduces injuries, saves time, and increases productivity. According to Roy, Joel, and Jim, it works great in all types of soil, including clay and rocky soil.

How does it work? Basically, it works like a mini pile driver. It hydraulically lifts a steel blade and drives it into the ground, leaving a slotted hole in the ground to into which a delineator is inserted. It usually only takes one or two punches to get the hole to the proper depth. The punch drew a lot of attention at the Expo.

If you'd like more information, Jimmye and Errol will be willing to fill you in on the details. They can be reached at (509) 575-2575.

Exhibitors Jim Crownover (lt.) and Joel Havlina (rt.)

Congratulations to the WSDOT South Central Region Maintenance Team for your remarkable invention, and thank you Roy, Joel, and Jim for submitting the information on this "Better Mousetrap," and taking the time to demonstrate it at the Expo! ▲

The Great Pacific Northwest Technology Show-and-Tell

A Great Success!

By: Dan Sunde, Director WST2

Over 600 people attended the first ever Pacific Northwest Transportation Technology Expo held at the Grant County fairgrounds in Moses Lake, Washington, September 12-14.

Exhibitors and demonstrators of some of the latest technology in transportation engineering, construction and maintenance gathered to showcase their wares to state and local agency personnel from across the Pacific Northwest. The Expo was developed and sponsored through a partnership between the WSDOT Maintenance Office, Washington State Technology Transfer Center (WST2), and FHWA.

The three-day event was designed to showcase current leading edge technology emerging from research, new technology entering the market, and innovative "home grown" tools and techniques developed by public agency personnel through live demonstrations. To carry this out the Expo was comprised of three elements:

1. A 4-track agenda of demonstrations that was repeated each of the three days;
2. Over 60 side displays and demonstrations by a variety of exhibitors; and
3. Over 30 tools, equipment modifications, and process improvements created by state and local agency personnel.

Top right: Clay Wilcox, the Technology Expo Development Committee co-chair, (ctr.) and committee members Marty Weed and Lon Ostenson work out the details.

Bottom: Attendees check out "Mousetrap Row".

Things You Can Buy Tomorrow
Several new technologies that have recently emerged from research were demonstrated. Attendees were wowed by a cone truck developed by the Advanced Highway Maintenance and Construction Technology Center (AHMCT) from the University of California-Davis that automatically places traffic cones, then picks them up...in forward and reverse. The "Cone Shooter" was demonstrated by Aaron Raley and Robert Bosler from AHMCT. This research prototype was something you had to see to believe! Although it is currently

only a prototype, CalTrans is in the process of selling the licensing rights so that it can go into production. The production model will have a much greater cone capacity than the 80-cone prototype.

CalTrans also brought a "smart" snowplow that incorporates radar, GPS, magnetic sensors, and other hi-tech devices to operate in total whiteout conditions.

Minnesota DOT exhibited their version of a "Smart Snowplow" through a simulator. The simulator, a computerized truck cab mock-up, allowed attendees to experience navigating in a zero visibility situation. It included a head-up display and a vibrating seat to alert the driver that he or she is drifting out of the travel lane. Next year we hope to have the actual truck at the Expo.

Top: Aaron Raley amazed attendees with AHMCT's Cone Shooter as it placed, retrieved, and stored traffic cones on the fly.

Left: The Cone Shooter prototype stores 80 cones but a larger capacity version is planned.

Above: MinnDOT's "Smart Snowplow" simulator allowed attendees a hands-on virtual ride.

Above: The Caltrans/AHMCT Smart Snowplow.

Left: Three of the many WSDOT trucks incorporating a variety of innovative improvements.

Things Available Today

A wide variety of new equipment that is commercially available was also demonstrated. One of the most popular was "Boulder Buster," a rock blasting technology imported from South Africa. A small .22 caliber charge is placed into a hole drilled into the rock. The hole is then filled with water and the charge is set off. The water can't compress, so it seeks out the weak parts of the rock's structure and blasts the boulder into little rocks. Because the blasting charge is so small, the blast is contained by only a rubber mat used for protection. Certification to handle it is not required.

Several pipe repair products were demonstrated. Ultraliner, a new trenchless technology, was

Two photos to left and photo below on the left: Paul Kunze of BDS Inc. prepares for his demonstration of Boulder Buster, one of the most popular demonstrations at the Expo.

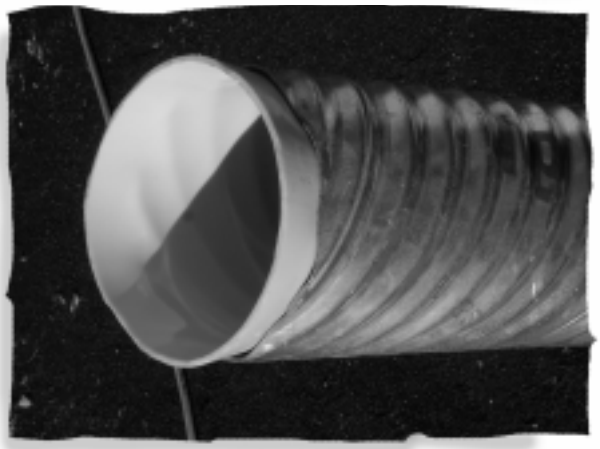
Photo below on right: The boulder busted

Setting the charge…

one good tug…

and big rocks are little rocks!!!

demonstrated by Environmental Services, a division of Columbia Pumping. The system uses a small robot to tow softened PVC pipe through an existing culvert or sewer system. The ends of the PVC pipe are plugged with an inflatable bladder, and hot steam is pumped into the pipe to inflate it. The PVC expands until it lines the inside surface of the sewer pipe. When allowed to cool, the PVC pipe hardens to form an approximately 1/4-inch thick PVC liner that conforms to the inside of the host pipe, forming a strong "pipe-within-a-pipe." The robots are then run through the pipe to cut trunk lines and seal any joints if necessary.



Tools to do localized patches on pipes were also demonstrated. Using a blowtorch, Advanced Drainage Systems demonstrated a heat shrink process similar to a large scale electrical shrink tube, and Environmental Services applied an epoxy coated sleeve liner to the

Top right: Advanced Drainage Systems applies their heat shrink process.

Above left: Environmental Systems team completes their installation of Ultraliner, a new trenchless technology.

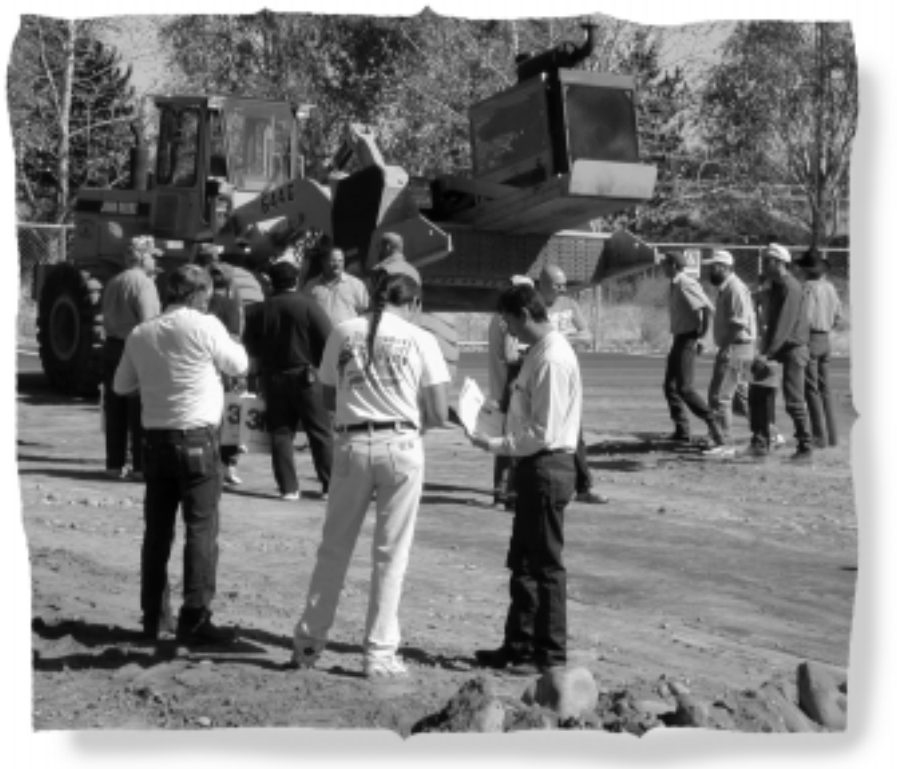
Middle right: The finished Ultraliner pipe-within-a-pipe.

Bottom right: The Environmental Systems team applies a localized epoxy patch to a damaged culvert.

interior of a damaged pipe by pressing it into place with an inflatable bladder with the assistance of robots.

Ford Manufacturing cleaned and reshaped ditches with their Ditchmaster. Ditchmaster is a truck with an auger mounted parallel to the truck's centerline. As the auger turns, it grabs silt and debris that has collected in the ditch and carries it to a conveyor, which in turn dumps the debris into the truck's storage bin for disposal.

Road Crusher, a mobile rock crusher that mounts onto a front-end loader, pulverizes rocks in place. RoadTech demonstrated the ability of Road Crusher to turn a windrow of 16" diameter rocks into sand.



Clark County, Washington, Public Works Department demonstrated their "Beach Cleaner" by cleaning sandy ground of trash and dangerous materials as small as a dime.

Weedseeker sprayed weeds —and only the weeds! Mounted in the back of a pickup truck, this remarkable weed sprayer identified and applied herbicides only to plants from a sensitized spray bar across the back of the truck. No overspray. No waste.

NorStar incorporated GPS and a sophisticated computer system with GIS into their spray truck to document and map spraying activities and roadside information. It had a side-mounted spray head for roadside spraying.

Two of the newest pieces of equipment provided very interesting demonstrations of automated pothole patching. Roadpatcher was a one-person operation. With a remote controlled nozzle affixed to the end of a boom mounted to the front bumper of a truck, the driver can remotely clean a crack or pothole with a blast of compressed air, fill the hole with tack coat and asphalt-coated aggregate, and top it with surface aggregate.

Road Renovator housed an operator at the rear of the truck, standing at a protected control panel. As the operator manipulated the controls, the truck dug out the pothole with a heavy-duty rotary grinder, vacuumed up the debris, filled the hole with base material from storage bins in the truck, placed hot ACP similar to the existing pavement, and compacted it with a hydraulic press!

To*p Photo:* Observers discuss the Road Crusher demonstration.

Left photo: Road Crusher turns 16" rocks into sand.

Top left: Clark County's Beach Cleaner kicks up dust as it cleans things up.

Top right: Checking out new snow blade technology.

Middle left: Weed Seeker sprayed only the vegetation.

Middle right: Getting a close up view of the Norstar GPS savvy spray truck.

Bottom left: Roadpatcher finishes up a one-operator, remote-controlled pothole patch.

Bottom right: Discussing the snowplow blade demo with the expert.

Better Mousetraps—Things to Build Yourself

The third element of the Expo featured tools, equipment modifications and systems that public agency personnel created to make their jobs easier, safer, and less costly.

These Do-it-yourself inventions were nicknamed, "Better Mousetraps." The nickname was derived from the old adage, "Build a better mousetrap, and the world will beat a path to your door." All entries competed for the Crystal Mouse Award, which is a recognition award sponsored by the WST2 Center and Washington Partnership for Quality Transportation (WPQT). The inventions ranged from very simple but effective tools to sophisticated machines involving high tech. All were inventive, cost effective, and labor saving.

The WSDOT Olympic Region demonstrated their award-winning raised pavement marker button truck. They modified a truck to simplify and speed the placement of raised pavement markers (RPM's). They built an operator's seat near the road surface just in front of the left rear wheel, behind the cab. They installed an air nozzle to clear the road surface with a blast of air, and an adhesive gun that shoots a shot of adhesive so the RPM can be placed by hand. A pneumatic chisel helps remove existing RPM's.

The Olympic Region also demonstrated their paint truck, which allowed a one-person painting operation. It carries stencils, a sprayer system, racks for stencils, and a paint dolly that allows placement of crosswalk markings easily and quickly without the need for a stencil.

A heavy-duty hydraulic roadside delineator punch exhibited by Jim Crownover, Joel Havlina, and Roy Gilliam of WSDOT SC Region's Connell Shop won the 2000 Crystal Mouse Award. The Delineator Punch was designed and built by Errol Rhode and Jimmye Crawford of WSDOT South Central Region Maintenance Shop in Yakima. Congratulations to the winners! For more information on their invention, see the Crystal Mouse Award article in this issue.

There were many great ideas! Several other "Better Mousetraps" tied for second place, with just two

votes separating them from first place. They include:

- The Guardrail Straightener, WSDOT South Central Region, East Selah Maintenance Shop, exhibited by Mary Taylor.
- The Catch Basin Grate Puller Jack, WSDOT Northwest Region, Everett Maintenance Shop, Bill Jantz, inventor;
- A Utility Trailer, WSDOT North Central Region, Ephrata Maintenance Shop, exhibited by Mary Pace.

Left: Pete Peterson of WSDOT Olympic Region applies a cross walk without a template using an ingenious cart applicator and Olympic Region's methyl methacrylate truck.

Middle left and right: Mary Taylor, WSDOT South Central Region's Selah Shop, shows how their Guardrail Straightener works as a ram.

Bottom left: From left to right, WSDOT's SRview video imaging van, WSDOT's Roadview GPS van, and Thurston County's CRview video imaging van.

Bottom right: Mark Finch behind the console of WSDOT's Roadview.

A remarkable number of "Better Mousetraps" were invented and demonstrated by Bill Jantz of WSDOT'S Everett Maintenance Shop in Northwest Region, with help from co-worker Tim Nash:

- Snow plow blade stands for blade storage,
- Snow plow jacks to assist with mounting snowplow blades,
- An ACP curb form with a tamper for building ACP curbs,
- Hide-away fittings mounted on the back of a dump truck to protect them when paving machines are connected to the truck,
- A folding bumper-mounted cone platform for placing traffic cones,
- and a modified pedestrian signal switch mounted to the rear of the cone truck for use by the cone setter to signal the truck driver.

Bill brought and demonstrated an invention by Ralph Knutsen, WSDOT Northwest Region, called a "Rut-Buster" that fills wheel ruts.

Top: Checking out Bill Jantz's Catch Basin Jack

Middle: Bill Jantz's Catch Basin Jack, WSDOT Northwest Region Everett Maintenance Shop

Bottom: Bill Jantz demonstrates his ACP Curb Form and tamper.

Other great Mousetraps included;

- GIS / GPS Drainage Facility Inventory, exhibited by Art Seeley and Paul Marsh of Pierce County GIS / GPS Department;
- a Field Maintenance Training Program developed by John Cutter and John Schnaderbeck of Pierce County Road Maintenance;
- A digital imaging van, invented and built by Eric Jackson, WSDOT TDO, Hans Cregg, and Roger Chappell, WSDOT Olympia.
- Thurston County's CR view, a digital video imaging van built by Dan DeBoer and Hans Gregg, was inspired by WSDOT's SRView and championed by Thurston County's Les Olsen.

Top left: Bill Jantz points out his modified pedestrian switch used by a cone setter to signal the truck driver during cone operations.

Top right: Pedestrian switch mounted to rear of cone truck to signal driver.

Middle: Ralph Knutsen's Rut Buster fills wheel ruts.

Bottom: Bill Jantz puts the finishing touch on his folding cone platform with placement of the rail.

A complete list of "Better Mousetrap" exhibitors follows this article. We apologize if we have missed any names. Some inventors names have been lost over time. If you have more information or there are corrections, please let us know. We want to give appropriate recognition.

Overall, the 2000 Tech Expo was rated a great success by exhibitors, attendees and vendors alike. The WSDOT Maintenance Office, WST2 Center, and FHWA are already making plans for the 2001 Expo, also to be held in Moses Lake. Watch for the announcements…and get your "Better Mousetraps" ready to share! We plan on being bigger and better next year!

Kudos!
We want to extend special thanks to the following people for their super efforts to make this Expo a success:

- Keith Walker and the WSDOT Maintenance Shop staff in Moses Lake
- Al Holman, Manager, Grant County Fairgrounds, and his crew, for their extra-special hospitality and helpfulness
- WSU Conferences and Professional Programs

The Tech Expo Development Committee:

- Clay Wilcox, WSDOT Maintenance Office (Co-chair), OSC Olympia
- Dan Sunde, WST2 Center (Co-chair), OSC Olympia
- Cathy Nicholas, FHWA, Olympia
- Kelly Newell, WSU Conferences and Professional Programs, Pullman
- Jenna Foster, WSU Conferences and Professional Programs, Pullman
- Lon Ostenson, Clark County
- Marty Weed, WSDOT Olympic Region, Tumwater
- Jack Zeppenfield, City of Moses Lake
- Dale Luiten , WSDOT Eastern Region, Davenport
- Tom Rountree, King County DOT/RSD, Renton

Without you it wouldn't have happened.

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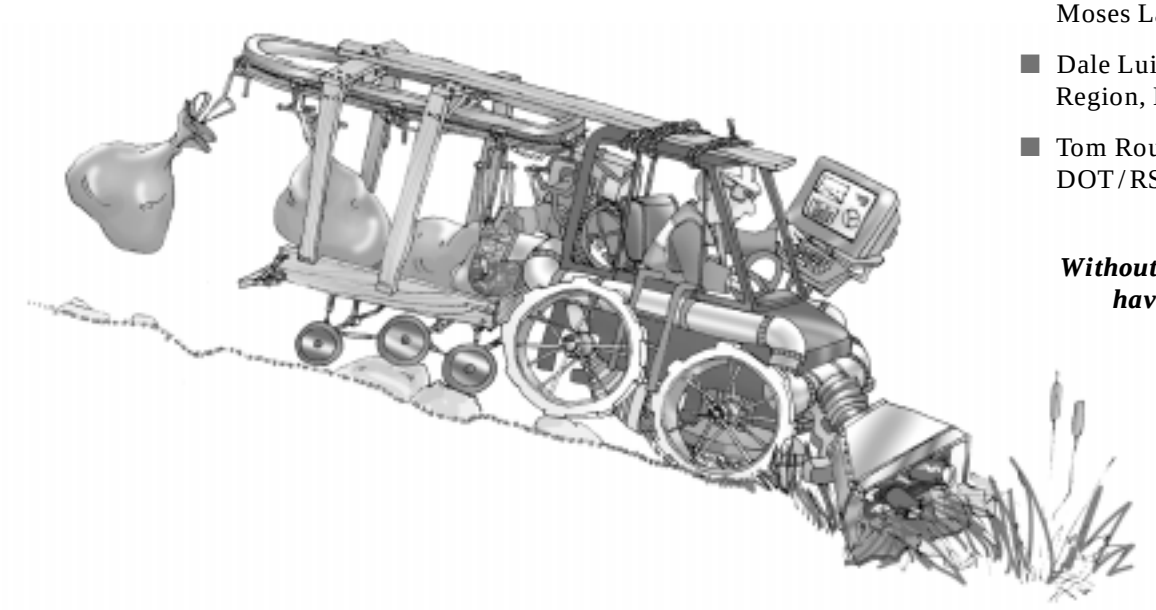

The "Better Mousetrap" is awarded each quarter for the most innovative working ideas presented by a public agency and published in WST2

Award:
The best concepts will be published in the WST2 and posted on the WST2 Web Page.

All entrees will receive a certificate and a "Better Mousetrap" baseball cap.

All participants in published mousetraps will be included in competition for the annual "Crystal Mouse" award.

Eligibility:
Washington State Public Agencies.

Liability:
We will do our best to return all materials submitted.

Jurors:
A panel of local agencies and state engineers and technicians. To obtain a list of jurors write to the address below.

Mail To:
"Better Mousetrap"
WST2 Center
Transportation Building
P.O. Box 47390
Olympia, WA 98504-7390

E-mail:
WST2Center@wsdot.wa.gov

For questions:
Dan Sunde, Director Of Technology Transfer
SundeD@wsdot.wa.gov
(360) 705-7390

"Better Mousetrap" Submittal Form

Name of the "Better Mousetrap":

Submitter's Name:

Title:

Agency:

E-mail Address:

Address:

City: State: Zip+4

Phone Number : ( )

Developer's Name(s):

Title:

Agency:

E-mail Address:

Address:

City: State: Zip+4

Phone Number : ( )

Description of the Better Mousetrap"

Why was it necessary?

How does it work?

How was it built? (Include Sketches, Photos, Drawings)

How does it perform?

Better Mousetraps

Here is a list of "Better Mousetraps" that were shown at the Year 2000 Pacific Northwest Technology Expo in Moses Lake, the names of their inventors or the people who exhibited them at the Expo, and the agencies they represent:

Item	Inventor or Exhibitor	Agency
GIS/GPS Drainage Facility Inventory	Art Seeley, Paul Marsh	Pierce County GIS/GPS Dept.
Field Maintenance Training Program	John Cutter & John Schnaderbeck	Pierce County Road Maint.
Speed Bumps	Kent MacDonald	Clark County
SR View Van	Eric Jackson, Hans Cregg, Roger Chappell	WSDOT, Olympia
Intelligent Vehicle Initiative	John Scharffbillig	Minnesota DOT
Digital Orthophoto	John Tull	WSDOT Materials Lab, Olympia
CR View	Dan Deboer & Hans Cregg	Thurston County, Olympia
GPS Mainline Control Survey	Mark Finch	WSDOT
Work Zone Traffic Control Vehicle	Sue Mackey & Brian Farrar	WSDOT OR Tacoma Traffic Office
Delineator Post Punch	Jim Crownover, Joel Havlina, & Roy Gilliam, exhibitors,	WSDOT SCR Connell
	Errol Rhode & Jimmye Crawford, Inventors	WSDOT SCR Yakima Maint.
Folding Cone Platform	Bill Jantz, Inventor, Tim Nash, Exhibitor	WSDOT NWR Everett Maint.
Snowplow Jacks	Bill Jantz, Inventor, Tim Nash, Exhibitor	WSDOT NWR Everett Maint.
Utility Trailer-Litter Bag Pick-up	Rich Littleton, Mary Pace, Exhibitors	WSDOT NCR Ephrata Maint.
Rut Buster	Ralph Knutsen, Designer, Bill Jantz, Inventor	WSDOT NWR Everett Maint.
ACP Curb Form	Bill Jantz, Inventor, Tim Nash, Exhibitor	WSDOT NWR Everett Maint.
Catch Basin Grate Puller Jack	Bill Jantz, Inventor, Tim Nash, Exhibitor	WSDOT NWR Everett Maint.
Hideaway Fittings on Dump Truck	Bill Jantz, Inventor, Tim Nash, Exhibitor	WSDOT NWR Everett Maint.
De-Icer Truck Grip tubes & nozzles	Kerry Seiler, Inventor, Mary Pace, Exhibitor	WSDOT NCR Ephrata Maint.
Sand Deflector	Mike Wilson, Inventor, Okanogan WSDOT	WSDOT NCR Twisp Maint.
Paint Trailer	Peggy Dennis, Inventor	WSDOT SCR Walla Walla Maint.
Guidepost Driver Sleeve	Kit Lane, Inventor	WSDOT SCR Walla Walla
Extendable Litter Bag Cage/1-ton Truck	Jeff Brodhead, Inventor	WSDOT SCR Walla Walla
Utility/Patch Truck	Paul Morton	WSDOT ER Colville Shop
Guardrail Straightener	Don Remily (ret.), Andy Hernandez (ret.), Ben Herald, (ret.) Inventors Mary Taylor, Exhibitor	WSDOT SCR East Selah Maint.
Davidson Marker Placer	Don Remily, Inventor, Dwight Simon, Exhibitor	WSDOT SCR East Selah Maint.
Guardrail Repair & Service Vehicle	Tom Howell, Guy DuPuy, Developers	WSDOT SWR Vancouver
Loader-Mounted Patch Box	Alan Nelson, Darwin Van Berkom	WSDOT OR Tacoma Maint.
Button Truck	Ron Arrant, ret, & Bob Ostrom, Inventors	WSDOT OR Tumwater
Methyl Methacrylate Truck & Cart	Pete Peterson, Inventor, Tom Bruce, Exhibitor	WSDOT OR Tumwater

Our apologies to those individuals who participated in the process of creating or demonstrating these inventions but are not mentioned. If you have more information, or if there are corrections, please contact Wendy at 360-705-7386.

Top left: Darwin Van Berkom, WSDOT Olympic Region Tacoma Shop, with the WSDOT Olympic Region Tacoma Shop's ACP Patch Box.

Middle left: Road Renovator shows what it can do.

Middle right: Getting a close look at Mike Wilson's Sand Deflector mounted to their snowplow in the North Central Region Twisp Shop.

Bottom left: Discussing Kerry Seiler's deicer truck grip tube and nozzle distribution system.

Bottom right: WSDOT North Central Region Twisp Shop's Deicer distribution system.

Top left: Tom Page shows a Culvert Mark Template developed by several maintenance techs in the Eastern Region Davenport Shop.

Top right: Questions, answers, and sharing ideas.

Middle left: One of the forty indoor vendor displays.

Middle right: WSDOT North Central Region Ephrata Shop's Maintenance Utility Trailer with side drop and tipping chassis saves backs and cuts time during litter pickup.

The Washington State Access Management Law

By Dave Sorensen, WST2 Traffic Technology Engineer, Highways & Local Programs Service Center, and Jerry B. Schutz, WSDOT Northwest Region/Mt. Baker Area Transportation Planning Manager

In 1991, the Washington State Legislature passed a law, RCW 47.50, Highway Access Management, that required the Department of Transportation to develop two Washington Administrative codes (WAC), one describing the process used by WSDOT for permitting access to state highways in unincorporated areas, and the other establishing an access control classification system and standards.

WSDOT's role in access management is one of issuing permits in unincorporated areas, adding access management into its construction projects, and encouraging and supporting the efforts of local agencies to do the same.

Role of the Local Agencies

The role of local agencies in access management varies between the cities, counties, and metropolitan planning organizations (MPO). The RCW gives the cities the responsibility for issuing access permits on non-limited access highways in the incorporated areas, but requires them to "adopt standards for access permitting on streets designated as state highways which meet or exceed the department's standards, provided that such standards may not be inconsistent with standards adopted by the department." Over and above the requirement for cities to adopt an access management regulation, both the cities and the counties are encouraged to incorporate access management into their development regulations and comprehensive planning. [3] Around the country, many MPOs have taken an active role in encouraging access management. Adopting policies and incorporating access management into project selection criteria and into long range planning approaches can do this.

The law dictates specific roles for each agency, but responsibility cannot stop there if the citizens of the state are to realize the benefits of access management.

Making access management work requires a team approach with state government, local agencies and the public working together. The law dictates specific roles for each agency, but responsibility cannot stop there if the citizens of the state are to realize the benefits of access management. Municipalities need to incorporate the requirements of the law into their codes and implement them into their practices as well as incorporating the concepts into comprehensive planning and land use regulation. Counties and regional planning agencies can help to achieve the goals of access management by incorporating the concepts into their policies and appropriate regulatory actions as well.

Most municipalities issue permits for access to state highways within their boundaries. Counties, however, do not issue state highway ac-

Access Management in Washington State

Access management is a program that combines traffic and land use regulatory techniques aimed at protecting the public's investment in its streets and highways as well as producing other benefits.

Benefits of access management include:

- **Safety** - By eliminating some conflicting traffic movements and smoothing traffic flow, accidents are reduced.
- **Capacity** - Application of access management techniques preserves the capacity of roadways. Signalized intersection spacing and frequency are particularly important.
- **Support for Alternative Modes** - Access management supports alternative modes such as walking, bicycling and transit by reducing access points that interrupt trips and are safety hazards.
- **Human Factors** - Access management smooths traffic and reduces air pollution, creating more aesthetically pleasing roadways.
- E**conomic Factors** - Businesses profit by protecting their client base. Client base has been found to be related to travel time.

▲

cess permits but can educate developers of adjacent lands for a smooth permit application process by incorporating access management into their land use codes. Incorporation of these principles into their land use codes makes the access permitting process easier to administer.

Regional Planning Organizations

Metropolitan Planning Organizations (MPO) and Regional Transportation Planning Organizations (RTPO) can encourage access management among their member agencies by adopting policies, encouraging agencies to incorporate access management into their construction projects, and incorporating access management into their project prioritization process.

Access Management Classifications

Washington State has adopted a system of five access management classifications for the state highway system. These classifications seek to balance the needs and access rights of adjacent property owners with the need of the traveling public to have a smooth traffic flow, and to correlate those needs in proportion to a number of factors such as development level, speed limit, and the functional classification of the highway.

Implementing Access Management

Access management can be incorporated into land use regulations, access permitting procedures, access management plans, and highway construction projects.

Developers can also incorporate access management into the plans for their projects.

Access management deals with that portion of the highway system that connects the transportation system to the land use. Land use regulation

State Highway System Classification Description Table

Highway Classification & Definition	Typical Speed Limits	Minimum Access Spacing	Access Limitations
Class 1 Mobility is primary function	50 and up	1320'	1 access only to contiguous parcels under same ownership. Private direct access not allowed unless no other reasonable access exists. (Must use county road system if possible.)*
Class 2 Mobility favored over Access	35-50 Urban 45-55 Rural	660'	1 access only to contiguous parcels under same ownership, unless frontage > 1320'. Private direct access not allowed unless no other reasonable access exists. (Must use county road system if possible.)*
Class 3 Balance between Mobility and Access in areas with less than Maximum Buildout	30-40 Urban 45-55 Rural	330'	1 access only to contiguous parcels under same ownership. Joint access for subdivisions preferred, but private direct access allowed with reason.
Class 4 Balance between Mobility and Access in areas nearing Maximum Buildout	30-35 Urban 35-45 Rural	250'	1 access only to contiguous parcels under same ownership.
Class 5 Access needs may have priority over Mobility needs.	25-35	125'	More than 1 connection per ownership allowed with reason.

** Access connection shall continue until such time that other reasonable access to the general street system becomes available and is permitted.*

can be designed to minimize impacts on the transportation system while supporting the purpose of the land development. Access management can be incorporated into land use by applying the concepts to land developments and subdivision regulations, including policies and principles in local comprehensive plans, providing developer incentives, and by carefully considering the economic impacts not only of applying access management but also of not doing so.

The Permitting Process

The access permitting process applies access management principles at the most fundamental level. Each of the other levels of application is discretionary, but the permitting process is required.

Access Management Plans

Access management plans are created when one or more agencies work to improve conditions on a highway after poor access management practices have resulted in problems or before problems start to occur. These plans seek to allow access to adjacent lands at locations and in ways that minimize impacts on the highway. Examples of techniques that can be used include consolidating driveways, locating driveways in spots with good sight distance both directions, and creating turn lanes so through traffic travels unimpeded.

Access management plan administration requires the selection of a lead agency, establishment of funding partnerships, agreement on re-

sponsibilities, and definition of approval processes.

Plan development requires consideration of the following factors: defining the study limits, public involvement, education alternatives development, technical analysis, alternative evaluation negotiations, plan adoption, and plan implementation.

Public Involvement and Education

The backbone of almost any access management effort is public involvement. Property owners consider many access management applications a threat to them. They are more likely to cooperate if they are approached at an early stage of the process. They need to be invited to help solve a problem as part of a group rather than be asked approve a proposal that agency staff has already developed.

Public education is the first step in a successful public involvement process. The public needs to understand what access management is and what the benefits are before they will buy in to it. Public involvement requires building trust early, maintaining continuous involvement, providing good information, and being responsive to the public.

When designing construction projects that will incorporate access management applications, it is important to remember that it is not a perfect world. Sometimes improving existing conditions is the best that can be done. Taking the long-term perspective requires that we accomplish what is realistic now while working toward the ideal situation over time.

WSDOT Staff Support

One of the roles of the Department of Transportation is to provide support for the local agencies. Staff at the Olympia Service Center can provide information regarding access management and the law. Local agencies can contact the Development Services Engineer at their regional WSDOT Office for assistance with implementing a plan.

Local Perspective

Local agency access management policies for use on the local grid system are normally adopted by ordinance. State Statute RCW 47.50 requires incorporated cities to have in place access management policies for non limited access state highways in their jurisdictions, equal to or exceeding those of WSDOT. The local agency has the option to adopt WSDOT's access management rules that are in the Washington Administrative Code (WAC) to fulfill this requirement. WAC 468-51 and 468-52 may be used by cities that are the permitting authorities if they have not adopted an enacting ordinance as required under Chapter 47.50 RCW.

If a State Highway enters the boundary of an incorporated city, highway access connections are controlled by the local agency, with the exception of limited access highways.

National Perspective

Both the Federal Highway Administration and the Transportation Research Board recognize the importance of access management. Recent and ongoing research is providing new insights into the applications of access management principles. ▲

"Access Management in Washington State: Guidelines for Local Agencies," by Jerry B. Schutz

The backbone of almost any access management effort is public involvement.

Infrastructure Management, Covering Your Assets, and The Great GASB 34

By Roger Chappell, WST2 Engineering Systems Specialist WST2 Center

In this article I would like to give a brief introduction to Asset Management Systems (AMS) and GASB 34.

But first, we will begin with Infrastructure Management Systems (IMS). I have been a proponent of Infrastructure Management for a number of years now, and I still fail to come up with a succinct definition to truly describe what an IMS really is. These types of systems seem to be in a constant state of dynamic evolution.

The best I can come up with for a one-line description is this: Infrastructure Management is a holistic approach to managing complex infrastructure systems in order to maximize their efficiencies and resources for the benefit of all users.

I know that it sounds as clear as mud, but I think it is a good starting point.

Let's start with the word holistic: The American Heritage Dictionary defines it as *emphasizing the importance of the whole and the interdependence of its parts.* It is a bird's eye view of how your organization functions as a whole, and how it resides and interacts in an environment of other diverse organizations.

Infrastructure Management is: A holistic approach to managing complex infrastructure systems in order to maximize their efficiencies and resources for the benefit of all users.

Let us take your roadway system, for example. Your PMS (Pavement Management System) is used to manage one part of your whole transportation network. Its function is to preserve your roadway network at some given level of performance. It identifies when a roadway should have maintenance and rehabilitation performed on it, and at what point in time that it is the most cost effective. Using a Management System like Pavement Management, Maintenance Management, Safety Management, or Bridge Management is a proven cost effective way to manage your resources.

One of the problems of these "standalone" management systems is lack of integration and communication.

Back to our example of a PMS, let's say you spend a lot of time, effort, and money, to inventory, evaluate and analyze a section of pavement. The crystal ball algorithms say today is the most cost effective day to spend your limited resources on preserving this piece of roadway. So you hire someone do the rehabilitation (we won't talk about the ridiculous sum of money that you had to pay them in the process), and now the work is completed. Ahhh, so now you sit back in your easy chair smugly congratulating yourself on what a fine job you did managing your pavement. As you sit there sipping your mochacino and glancing at the nightly newspaper, you realize that the cover story is about a new 48" diameter sewer line that is going to run right down beneath the middle of your still steaming asphalt. Sitting there still in shock, mochacino all over the carpet, you murmur to yourself "there must be a better way!" The good news is that there Is a better way! That better way is Infrastructure Management.

The problem with implementing Infrastructure Management is that it is more than just buying some fancy new software program. It is a new way of doing business.

Keep in mind our definition of holistic: *emphasizing the importance of the*

whole and the interdependence of its parts. It is looking outside our "box" and seeing our role in the whole of the organization and our interdependence on other members. It is also more than somebody's nice little bell curve or algorithm. It goes to the heart of why we do what we do, for whom we do it, and how we can do it better. A big part of Infrastructure Management is simply good old fashioned communication.

In the scenario of the Pavement Manager with the sewer line running down the center of the freshly paved road, simply working with the sewer department could have saved much effort and money. Do you need a big fancy database system or GIS to do that, No. Simply sharing your six-month, one year and/or five year plans with each other would have worked. Databases and GIS's have their place in the management process, but they are only a tool to use and not a substitute for good management practices. Many of our databases and GIS's were built around the standalone systems that they serve. In order to be able to analyze and evaluate information, and to make informed decisions regarding the whole infrastructure, these systems need to be integrated with one another.

That is easy to say with the tap of the keyboard, but much harder to actually accomplish. In the last issue of the T2 Bulletin there was an article covering the Geospatial Framework Committee. This is an interagency group of people trying to reach a consensus on a common framework for GIS users to share data across governmental boundaries. It is projects like these that will help make Infrastructure Management more of a reality. Their website is: http://www.framework.dnr.state.wa.us.

The reason for discussing projects like these and concepts like Infrastructure Management and Asset Management is that many of the agencies are either contemplating or implementing some form of Infrastructure Management. Those agencies who aren't, will need to start thinking about it. Before we move on to talk about Asset Management, I need to mention one of the motivating factors driving the need to move to Infrastructure / Asset Management besides its own merits of making good business sense.

GASB 34

We need to talk about GASB 34.

GASB stands for **G**overnmental **A**ccounting **S**tandards **B**oard. The mission of the Governmental Accounting Standards Board is to establish and improve standards of state and local governmental accounting and financial reporting that will result in useful information for users of financial reports, and to guide and educate the public, including issuers, auditors, and users of those financial reports. Their website is:
http://www.rutgers.edu/Accounting/raw/gasb/index.html

A big part of Infrastructure Management is simply good old fashioned communication.

The number represents the statement number assigned by the Board, Statement Number **34**. It is titled, *"Basic Financial Statements and Management's Discussion and Analysis for State and Local Governments"*. This URL will take you directly to statement 34:
http://www.rutgers.edu/Accounting/raw/gasb/repmodel/index.html

This Statement establishes financial reporting standards for state and local governments, including states, cities, towns, villages, and special-purpose governments such as school districts and public utilities throughout the United States.

Important Aspects of the Government-wide Financial Statements

Governments should report all capital assets, including **infrastructure** assets, in the government-wide statement of net assets and generally should report depreciation expense in the statement of activities. Infrastructure assets that are part of a network or subsystem of a network are not required to be depreciated as long as the government manages those assets using an asset management system that has certain characteristics and the government can document that the assets are being preserved approximately at (or above) a condition level established and disclosed by the government.

Effective Date and Transition

The requirements of this Statement are effective in three phases based on a government's total annual revenues in the first fiscal year ending after June 15, 1999. Governments with total annual revenues (excluding extraordinary items) of $100 million or more (phase 1) should apply this Statement for periods beginning after June 15, 2001. Governments with at least $10 million but less than $100 million in revenues (phase 2) should apply this Statement for periods beginning after June 15, 2002. Governments with less than $10 million in revenues (phase 3) should apply this Statement for periods beginning after June 15, 2003. Earlier application is encouraged. Governments that elect early implementation of this Statement for periods beginning before June 15, 2000, should also implement GASB State-

ment No. 33, *Accounting and Financial Reporting for Nonexchange Transactions,* at the same time. If a primary government chooses early implementation of this Statement, all of its component units also should implement this standard early to provide the financial information required for the government-wide financial statements.

Prospective reporting of general infrastructure assets is required at the effective dates of this Statement. Retroactive reporting of all major general governmental infrastructure assets is encouraged at that date. For phase 1 and phase 2 governments, retroactive reporting is *required* four years after the effective date on the basic provisions for all major general infrastructure assets that were acquired or significantly reconstructed, or that received significant improvements, in fiscal years ending after June 30, 1980. Phase 3 governments are encouraged to report infrastructure retroactively, but may elect to report general infrastructure prospectively only.

To make a long story short, all governmental agencies will need to take a closer look at how they manage the infrastructure with which they have been entrusted, and how they communicate the results to the public. I am currently wading through reams of information on the topic and there will be more in depth information available in the next issue of the WST2 Bulletin. This article is only a brief introduction to the topic.

Asset Management

So that leads us to our final topic. Asset Management. What is it and how does it relate to Infrastructure Management?

If Infrastructure Management is *a holistic approach to managing complex infrastructure systems in order to maximize their efficiencies and resources for the benefit of all users,* then Asset Management builds on the framework of Infrastructure Management and melds into it the accounting aspects for management of the capital investments.

Some of the questions that Asset Management asks are:

- What is it, where is it located, what condition is it in, and how much is it worth?

Asset Management begins with an inventory of all fixed assets that make up the infrastructure at a certain level of capital investment. For this example we will use "assets" worth over $25,000 i.e., roadways, bridges, illumination, traffic signals, waste water piping systems. We ask ourselves these questions:

- How much has it cost both initially and historically to provide this component?
- How much will it cost to maintain it at some level of performance into the future?
- Is it sufficient to meet the need for which it was intended?
- What is it life span and depreciation rate?

I hope you can begin to see the difference between Asset and Infrastructure Management. It will become more apparent as we look more in depth in upcoming articles.

I leave you with a couple of good URL's for Asset Management. The first one is PublicWorks.com:

http://www.publicworks.com/content/homepage

If you type *Asset Management* into their search engine, you will find a lot of resources relating to all aspects of the topic from a public works perspective.

The second is the Office of Asset Management in FHWA.

http://www.fhwa.dot.gov/infrastructure/asstmgmt/index.htm

FHWA has a very good little publication called "The Asset Management Primer." It can be downloaded in a .PDF format from the "resources" section of their site.

I hope this introduction has fueled your curiosity for investigation into some of the challenges that lay ahead.

Questions or comments:

Roger Chappell
Technology Integration Specialist,

WST2 Center
Washington State Department of Transportation
Highways & Local Programs
Transportation Building
PO Box 47390
Olympia, WA. 98504-7390

Phone: (360) 705-7539
chapper@wsdot.wa.gov

▲

Welcome Aboard

The WST2 Center Welcomes Bob Brooks.

Bob Brooks recently joined the WST2 Center as our new Pavement Technology Engineer. Bob comes to us from the WSDOT Maintenance Office in the Olympia Service Center, where he was responsible for coordinating the activities of MAP, the Maintenance Accountability Process. Bob has a wealth of experience in maintenance operations and accountability, program management, contract plans preparation, and computer databases. He has been with WSDOT for more than 20 years.

Already Bob is organizing classes on "StreetWise" and an Introduction to Pavement Management, both of which are geared toward small cities, which will be features of the Northwest Pavement Manager's Association Conference next Spring. He will be teaching pavement condition field rating classes later in the year.

If you have any questions on pavement technology or the new Small City Pavement Preservation Program, give him a call at (360) 705-7352 or e-mail him at Brookbo@wsdot.wa.gov.

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Local Agency Guidelines Group List-serve

By Darlene Sharar, Standards and Procedures Engineer, H&LP-WSDOT

The Local Agency Guidelines Group (LAGG) list-serve is a statewide list to provide users of the Local Agency Guidelines (LAG) Manual information on interim revisions for the administration of their projects. The list-serve is hosted by Washington State Department of Transportation's (WSDOT) Highways & Local Programs Service Center (H&LP).

Unlike most list-serves, LAGG list-serve is not a discussion group to which all subscribers may post messages. The main focus of the LAGG list-serve is to notify LAG manual holders of updates and changes. Members of the list-serve may pose questions that, if appropriate, will be forwarded to the list-serve group by the list-serve administrator.

LAG updates normally occur twice each year and are distributed with the WSDOT Engineering Publication CD. For a variety of reasons, changes to the LAG may occur in the interim periods and may require distribution before the next CD is published. This list-serve will notify LAG users instantly when changes occur, and will provide a convenient means for them to obtain an instant update from H&LP's Design & Construction Headlines Web Page at: **http://www.wsdot.wa.gov/TA/Operations/LAG/LAGUpdates.html.**

To subscribe to the LAGG list-serve, go down that web page to LAG Updates List-serve, and click on LAGG-L@wsdot.wa.gov. Fill in your e-mail address, and click, "Submit." A notice will be sent to that e-mail address for verification.

Questions or comments can be directed to Darlene Sharar, H&LP Standards and Procedures Engineer, at (360) 705-7383 or sharard@wsdot.wa.gov. ▲

Fifth Seattle International Conference on Managing Pavements

Fifth International Conference on Managing Pavements
August 11–14, 2001
Washington State Convention and Trade Center
For Details checkout
www.engr.washington.edu/epp/pavements

NWPMA
Northwest Pavement Management Assocociation will participate with a presentation at the 5th Conference in lieu of holding a separate fall conference

Bringing the Nighttime Road to Life

By: Patrick Hasson, Safety Engineer, FHWA Midwestern Resource Center, Ernie Huckaby, Rudy Umbs

Background

The risk of dying in a crash at night is nearly three times the risk of dying in daylight hours. In 1998, about 27,000 people died in nighttime traffic crashes in the United States, even though only about 25 percent of travel is at night. One of the reasons that nighttime driving risk is so much higher is because in the daylight the road is filled with more visual cues that help to guide drivers and keep them on the road. Though a single causal factor cannot be assigned to nighttime crashes, it is clear that an individual driver's night vision characteristics and a lack of adequate visual guidance information are significant factors. In either case, if cues that are essential for safe driving are inadequate at night, the potential for a driving or judgmental error to result in a serious crash are considerably increased. The situation is only made worse when other factors — i.e. fatigue, intoxication, inclement weather, higher speeds of travel on some roadways, etc. - combine with inadequate traffic control devices to make nighttime driving less safe.

The issue of visibility on rural roads - i.e. the greatest distance under given weather conditions to which it is possible to see - is of special interest when one considers that there are many reasons that the risk of dying on a rural road is higher, including: differences in operating speeds; road geometry; functionality; and other factors. It is these factors that create the situation in which nearly 80 percent of all fatal rural road crashes are either run-off-the-road, intersection or head-on collisions. The possibility for any of these crash types is heightened at night, and for each, visibility is a key factor.

The risk of dying in a rural road crash is more than twice as high as the risk of dying in a crash on an urban road or a non-rural Interstate.

The Case for Retroreflectivity Visibility can be improved through a variety of means such as retroreflectivity, roadway lighting, and automobile headlights. Though retroreflectivity in the form of pavement markings and sign sheeting does not resolve all of the problems, especially in wet or other adverse weather conditions, its relative low cost and versatility makes it a preferred alternative for most applications today.

At night, with many of the visual cues missing, the driver relies on the added retroreflective elements of signs and markings such as edge lines and post-mounted delineators for curve preview and center lines for guidance in the curve. It is very possible that these will be the major visible elements to a driver on a road at night. The retroreflectivity of signs and markings can serve to provide positive visual guidance that helps drivers keep their cars in their lanes or on the road. They also offer the possibility to share critical warning, timely location and other information to drivers. The retroreflectivity of signs and markings is a critical ingredient in creating a much safer road environment.

As an example of the safety value added by retroreflectivity, consider a sharp curve on a rural road. In the daytime, there are many visual cues such as a line of trees or a guardrail that can alert the driver to the sharpness of the turn in time for a driver to alter their speed accordingly. Road engineers also use pavement markings to reinforce these cues. A retroreflective edge line in this situation will provide the driver with a long-distance preview of the curve while the center line will provide other useful guidance through the turn.

Retroreflective materials are subject to deterioration brought on by the natural elements and the ability for a sign, delineator or pavement marking to continue to provide qual-

ity information or guidance to a driver decreases over time. If some minimum retroreflectivity is not maintained, the sign, delineator or marking will not accomplish the job it was intended to perform. While the Manual on Uniform Traffic Control Devices (MUTCD) has required since 1954 that signs and pavement markings shall be reflectorized or illuminated, the MUTCD contains no minimum in-service retroreflective requirements for signs or markings. (Note: ASTM D4956-89 Standard Specifications for retroreflective sheeting purchase specification used by the States is not to be confused with in-service minimum levels of retroreflectivity.) This fact coupled with the recognized importance of retroreflectivity to highway safety motivated the U.S. Congress to pass a law in 1993 that required the Federal Highway Administration (FHWA) to establish minimum maintained levels of retroreflectivity for signs and pavement markings. What Does This Mean to You?

The minimum maintained levels of retroreflectivity that are accepted will have many potential impacts. First, it is likely that the guidelines will have the greatest impact on the maintenance of signs on the National Highway System (NHS). Beyond the NHS the impacts are less clear. Certainly, some States may require that all local road agencies adopt the minimum guidelines. However, other States may not go that far. But, the mere existence of minimum guidelines could create a situation in which local agencies are compelled for one reason or another - i.e. liability issues, etc. - to begin applying the minimum guidelines in their regular practice. As well, from strictly a safety point of view, minimum guidelines will provide a valuable tool for road engineers to use on roads that have high traffic volumes or for high hazard locations. For all of these reasons, it is essential that road managers and engineers stay abreast of the development of the guidelines and consider how they will have an impact in their future road programs.

In another vein, the costs associated with implementing minimum maintained levels of retroreflectivity for signs have been examined. Based on the average condition of road signs in 1994, the FHWA estimated in 1998 that 5 percent of signs under the State jurisdictions and about 8 percent of those under local jurisdictions would not meet the proposed minimum maintained levels of retroreflectivity and would therefore need to be replaced. This translated to a cost of about $32 million for the State agencies combined, and about $144 million for the local agencies combined. These are costs associated with replacing all signs at one time. The report concluded, however, that on a practical level, sign replacement rates would probably not be accelerated above current levels and many agencies would not likely feel any impact of implementing the minimum maintained levels of retroreflectivity. The report went further to state that the development of a sign inventory program that includes retroreflectivity measurements would lead to making investments in a planned manner that, in the long run, are likely to reduce the overall maintenance and replacement rates of traffic signs in the future.

What's Being Done?

The FHWA was performing retroreflectivity research to improve nighttime driving safety since the early 1980's. Some of the areas covered in this research included studies on the service life of sign, sign and pavement marking management systems, and traffic sign and pavement marking retroreflectometers. Following the Congressional requirement in 1993, the FHWA also completed research on what levels of retroreflectivity are needed to safely guide drivers at night, and analyzed the economic impacts to the public if minimum retroreflectivity values are established. The overall goal of all of these studies was to obtain information necessary to establish minimum maintained levels of retroreflectivity and to develop management programs and measurement devices which will be needed by the States and others to maintain traffic control devices at an adequate level. Thirty two States were actively involved with the FHWA in this research.

Recognizing that there are already many different models of hand held retroreflectivity measuring devices available today, the FHWA began to develop mobile units capable of measuring the retroreflectivity of signs and markings while driving at highway speeds. A van capable of measuring the retroreflective qualities of pavement markings was introduced and demonstrated a few years ago. Private industry is now manufacturing and selling these

units as well as providing contractual support for their operation and maintenance. Similar vans for measuring the retroreflective qualities of signs are now in development by the FHWA and will be available for demonstration purposes in 2000. In relation to the FHWA efforts, an AASHTO task force is actively reviewing completed research on this subject and intends to make a recommendation to FHWA on minimum maintained levels of retroreflectivity. The FHWA will consider this recommendation and other information before it issues a notice of proposed rulemaking (NPRM). After analyzing the comments to the NPRM, a Final Rule could be issued in 2001 for signs and 2002 for pavement markings. The rules will address plans to implement minimum maintained levels of retroreflectivity for each. The Federal Register notice invites the widest possible review and comment by the public.

Other Steps to Improve Visibility
Recognizing that retroreflective devices have their limitations in some circumstances, the FHWA is also examining a host of other possibilities for making roads safer at night.

For instance, there has been preliminary research on the use of **ultraviolet headlights** in automobiles. These headlights will allow drivers to use their low beam level yet see fluorescent traffic control devices as if they had their high beams on. This allows drivers to see better at night but does not create the glare problems associated with standard headlights. The FHWA, in cooperation with Volvo and others will be performing an extensive demonstration project with UV headlights and florescent signs and pavement markers next year.

Another area of interest is **phosphorescent materials** that could be incorporated into traffic control devices so that they will glow at night. This is an area that is developing rapidly and leading to new materials that glow for longer and longer periods. It is likely that in the next 5 years or less, there will be materials that can glow all night or for days at a time. These products may help to overcome some of the limitations of retroreflective materials. Finally, there have been tremendous advances in the development of **LED lights for use in augmenting pavement markings,** and several products are available today. Generally, the LED lights are small solar-powered markers that are installed in the pavement. Though most of the current applications of these lights have been outside of the United States, it is recognized that there may be value in using these devices in some hazardous locations. Currently, there is a proposal to install LED lights in a heavy fog area in California.

It is likely that in the next 5 years or less, there will be materials that can glow all night or for days at a time.

Conclusion
Retroreflectivity is a critical element for helping the U.S. Department of Transportation achieve its safety goal of reducing fatalities and injuries by 20 percent over 10 years. Although the FHWA has provided the primary guidance for many national efforts related to retroreflectivity, State and local highway officials have provided essential input throughout the process. Organizations such as the National Association of County Engineers, National Cooperative Highway Research Program, National Committee on Uniform Traffic Control Devices, American Association of State Highway and Transportation Officials, Institute of Transportation Engineers, State DOTs, the American Traffic Safety Services Association, the American Public Works Association and others have also been involved to ensure that the results of the extensive research activities and field evaluations are implemented reasonably and prudently through the rulemaking process. The FHWA expects that this cooperation will lead to minimum levels of retroreflectivity that will be maintainable, increase nighttime safety on the roads and ultimately result in fewer crashes, injuries and fatalities on our roads at night. In addition, the planned, systematic replacement and maintenance of signs and markings could reduce their overall maintenance and replacement rates in the future. While these types of benefits are appealing, it must be reiterated that the ultimate goal in pursuing these efforts is to elevate the existing safety of U.S. roads for the benefit of the entire driving population. ▲

Washington DOT Investigates the Soil Bioengineering Alternative

Lisa Lewis, Shannon Hagen, Mark Maurer, and Sandy Salisbury

Ms. Lewis, based in Redmond, Oregon, is a soil scientist with National Riparian Service Team. Ms. Hagen, watershed restoration specialist; Mr. Maurer, LA, Roadside and Site Development Manager; and Ms. Salisbury, landscape designer, are with the Washington State Department of Transportation in Olympia, Washington.

Soil bioengineering is an applied science that uses live plant materials and "soft" engineering techniques to alleviate environmental problems such as destabilized slopes. This approach involves building living systems using plants, soil, and other materials. Unlike other technologies in which plants are chiefly an aesthetic component of the project, in bioengineering systems, plants are an important structural component.

Unlike other technologies in which plants are chiefly an aesthetic component of the project, in bioengineering systems, plants are an important structural component.

In this applied research project, we used soil bioengineering techniques in an effort to provide viable alternatives for erosion control. Historically, civil engineers have relied primarily on geotechnical solutions, or "non-living" approaches, for slope and landslide stabilization.

The purpose of this research is not to argue one solution is better than the other. Road managers need all available tools to effectively do their jobs — this is an effort to meet that need.

Interagency cooperation

Lisa Lewis, soil scientist with the National Riparian Service Team (NRST), is serving as Principle Investigator (PI) for this project. The NRST is an interagency team composed of Bureau of Land Management, U.S. Forest Service, and Natural Resource Conservation Service employees. Research Assistant (RA) for this project is Shannon Hagen, watershed restoration specialist with the Washington State Department of Transportation (WSDOT). Along with NRST and WSDOT, the Washington State Department of Ecology (DOE) provided construction crews from the Washington Conservation Corps.

The project was developed to be a cooperative effort with WSDOT landscape architects, engineering geologists, geotechnical engineers, and road maintenance personnel. The PI and RA oversaw and coordinated the project, including site selection, survey, design, and implementation.

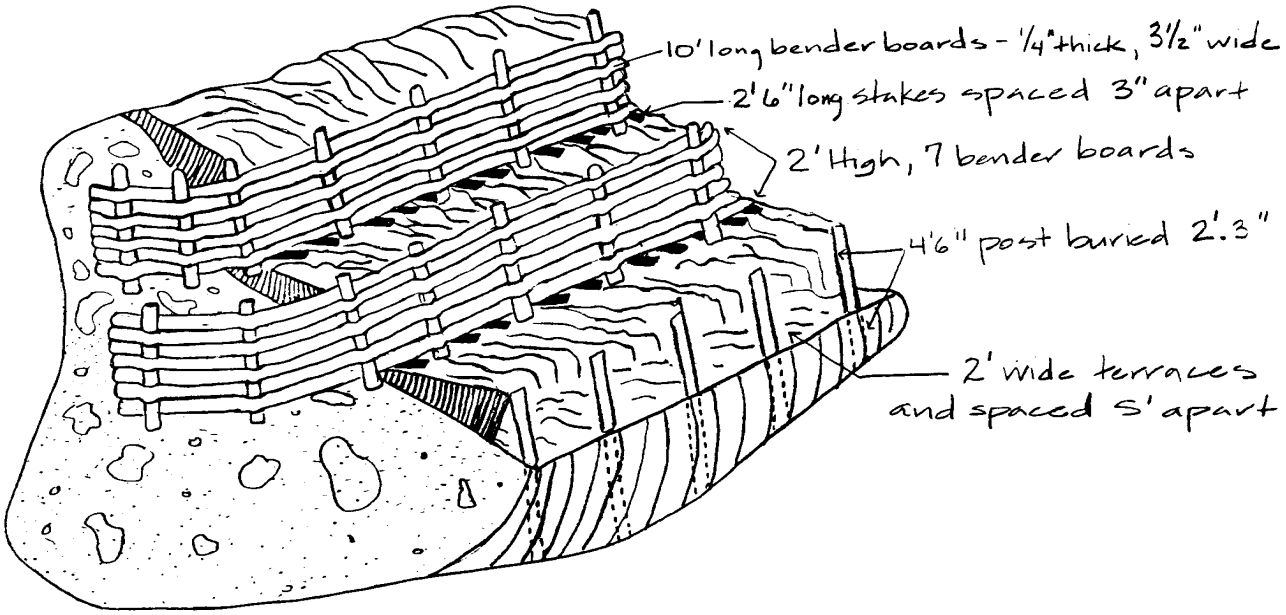
Site work began in October 1999 and was completed in May 2000, though evaluation of the sites' short- and long-term performance will be ongoing.

Site selection

After evaluating over 100 potential research sites, three areas were selected to address disparate climate and soil moisture conditions found in the state. Two are west of the Cascade Mountains, and one is in the more arid eastern part of the state. Additional criteria for selection included: suitability for soil bioengineering techniques, safety of public and work crews, visibility, and accessibility.

Per site, design options were discussed with a team approach. Individuals from WSDOT, DOE, and local Native American tribes discussed concepts and solutions. The PI incorporated these ideas into each project design and was responsible for making final project design decisions. Native plant materials were recommended by WSDOT landscape architects and approved by the PI. For all three sites, design revisions were required. Design revisions, however, are not uncommon for any construction project.

Bender Board Fencing



Material: Redwood or Cedar

Raymond

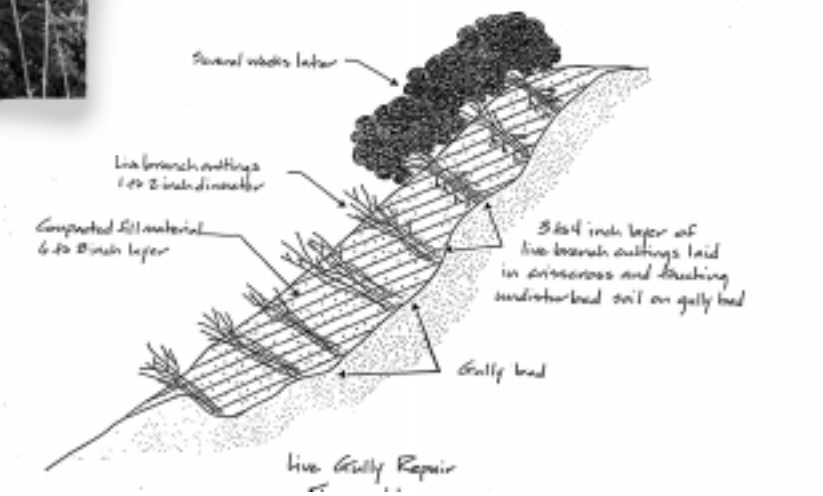
The 650-ft wide, 120-ft tall Raymond site is composed of layered lacustrine deposits. Small shallow rapid landslides have occurred where these weathering clay layers have left slope sections exposed to water movement. Too much slope moisture, and these layers slipped and moved downhill into the ditch. To manage stormwater runoff, maintenance activities required clearing of these plugged ditch lines. In doing so, the base of the shallow rapid landslide was undercut, leaving a portion of the area with an exposed vertical face. Water flow in the ditch, as well as excess water movement in the slope, caused further landsliding.

Constructed at Raymond:

- A 210-foot long live cribwall was constructed to stabilize the base of the slope, 150 feet of which measured 6 feet wide and 6.5 feet tall, with over 2,000 willow stems layered inside.
- Over 100 feet of willow walls were constructed in areas where previous earth movement left sections over-steepened and vulnerable to surface erosion.
- 145 feet of live fascines were constructed to prevent surface erosion.
- 1,300 native plants were installed to strengthen soils and to provide long term site stability, supplemented by 50 lbs. of grass seed for surface erosion protection.

Challenges.

After constructing 110 feet of cribwall, 40 feet of the slope base slipped and was considered too unstable to allow hand crews to work. As a result, the crew constructed sections of the cribwall offsite. Heavy equipment operators assisted in transporting three cribwall sections to the site, and with use of an excavator, lowered the sections into the slope base. This is a good example of safety concerns winning over design specifications. In the future we will do a slope stability analysis on slopes such as the one at Raymond. Materials procurement was also a challenge. Because soil bioengineering is relatively uncommon, materials often had to be custom ordered. The timber company sent logs larger than those ordered, which led to adjustments in the cribwall construction. Although the heavier timbers created a more solid, longer lasting structure, the logs were difficult to handle during construction.



PRESENTATION IN OLYMPIA ON SOIL BIOENGINEERING

Lisa Lewis, Shannon Hagen, Mark Maurer, and Sandy Salisbury will present their soil bioengineering research project in the Large Commission Board Room, Washington State Transportation Building, 310 Maple Park Avenue S.E., Olympia, Washington, on January 23, 2001, from 1:00 to 4:30 p.m. Local Agency personnel are welcome to attend, so please plan to stop in!

Chelan

This project site, measuring 650 ft wide and 80 ft high, is composed primarily of sand and ash deposits. The slope, too steep to establish a protective vegetative cover, was a chronic source of surface erosion and subsequent ditch maintenance needs.

Constructed at Chelan:

- The slope was reshaped to a 1.5h:1v slope to eliminate a vertical lip at the top.
- 1,875 feet of bender board fencing wall was constructed, terracing the slope to stop the chronic surface erosion and to establish "planting platforms." These walls are similar to the Raymond site's willow walls, but substituting cedar bender board for the willow because of the arid climate.
- 3,510 plugs (11 different species) of native vegetation were planted in the terraces behind each bender board wall, supplemented by 80 lbs. of grass and native seed.
- 27 cubic yards of compost was blown in place to enrich the soils.

Challenges.

Field reviews by two soil scientists and one geologist revealed soils to be a mix of sand and ash. The subsurface soils were compacted, or "cemented." Heavy equipment was used to reshape the slope's upper portions. As a result of the "rock-hard" slope, larger equipment, and two additional days, were needed to reshape the slope. Also, design of the bender board fencing walls had to be altered. To secure the fencing to the slope, the crew used rebar instead of wood stakes. Wood stakes could not be driven into the cemented soils.

Lost Creek

Lost Creek, 120 ft wide and 90 ft high, is composed primarily of marine clay and sand. Surface water erosion led to the formation of rills and gullies. These gullies funneled water and contributed to a small shallow rapid landslide movement. This site was selected to demonstrate a combination of geotechnical erosion control and soil bioengineering.

Constructed at Lost Creek:

- 2,700 square feet of rock apron was installed to mitigate surface erosion and stabilize the base of the slope.
- A total of 414 feet of willow wall with a brush layer base was constructed across the slope to spread the water out, slow it down, and prevent it from funneling through the gullies. The gullies were repaired by packing them with drain rock, soil, and willow stems after the willow walls were complete.
- 18 different species of native vegetation (1,083 plants total) were planted in the terraces and on the slope, supplemented by 16 lbs. of grass and native seed.

Challenges.
Miscommunication led to an application of composted biosolids to a compacted clay surface just before the hand crews began project work. The material was applied several inches deep and made walking on the slope very difficult. In addition, many of the erosion features were hidden by the compost. During rainstorms, the compost slipped off the compacted clay and entered the ditch. Additional miscommunication between the supplier and the PI lead to substandard (pit-run) material being substituted for sandy loam soil as the fill behind the terraces, potentially reducing the vigor of the willow growth in the structure.

Due to heavy rains, project work was often interrupted to implement emergency erosion control measures. Soil bioengineering projects must be installed when plants are dormant (late fall, winter, and early spring). This coincided with heavy rainfall (this area receives 200+ inches of rain a year). While this timing can be helpful in that it will not conflict with most construction projects, in this case, the constant, heavy rainfall demoralized workers.

Evaluation
A monitoring form and a related work sheet are being developed to establish success standards. Questions will include: Has the erosion condition been stabilized? Is the ditch clear of debris? Has movement on the slope been stopped? What percent of the slope has successfully been revegetated? Is there enough vegetation present to provide short and long term stability needs?

A cost-benefit analysis will be written and available at the end of the project. As mentioned in the beginning of the report, soil bioengineering solutions are usually less expensive than "hard" engineering fixes.

The partnerships formed between the different disciplines within the department as a result of this project will continue to benefit Washington's roadsides.

Lessons Learned
The PI tackled large erosional slopes and showed that WSDOT had the capability to stabilize these slopes with their associated, and often unexpected problems. We learned that soil probes and slope stability analysis should be done prior to the design phase of a project. We learned that even with the best of intentions miscommunication can occur. We will be more alert to that now.

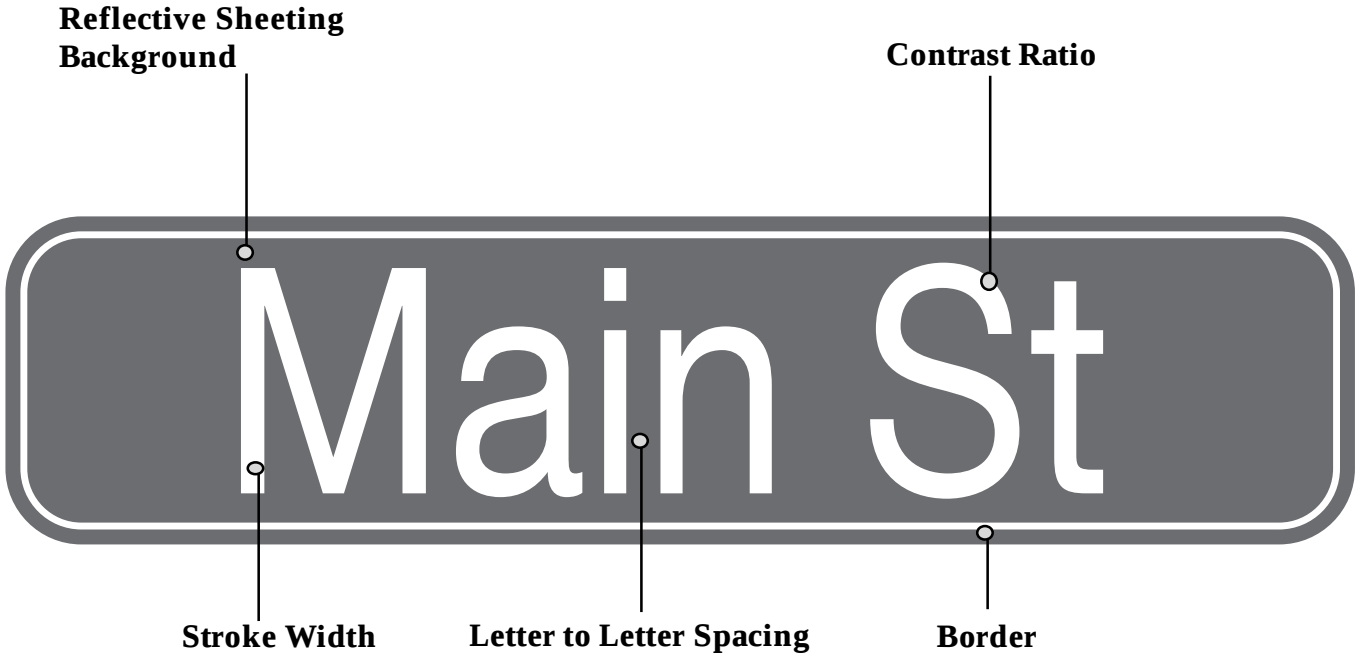
Soil bioengineering takes a multidisciplinary team of experts in engineering geology, roadside safety, landscape architecture, construction, soils, and maintenance. We also needed the expertise of project engineers, biologists, surveyors, public relations representatives, erosion control, and real estate services. The partnerships formed between the different disciplines within the department as a result of this project will continue to benefit Washington's roadsides.

We learned lessons in communication, in geology, and construction techniques which will allow us to do further projects with a more streamlined methodology and an increased awareness. What we confirmed is that this technique works, especially where soil moisture is available for the plants. This method just speeds up natural processes by providing a stable platform for plants to root and hold the soil on a continuing basis. It's working with nature.

The final report will be available online at:

http://www.wsdot.wa.gov/eesc/cae/design/roadside/.

How to Build a Better Street Name Sign



Reprinted by permission from 3M Directions, May 1999

For additional information, contact:

Jane E. Prosch-Jensen or Larry Nathan, 3M Traffic Control Materials Division
(615) 736-9096.

Many street name signs are neither bright enough nor large enough to easily read at night or in poor driving conditions. Here's how to make sure your signs perform as effectively as possible.

Target Value

Target value, the ability of a street name sign to stand out distinctly from its surroundings, depends upon the sign's size and color contrast with its background. The brightness of the reflective sheeting background will have the most impact on a sign's long-range target value. Green and blue provide the best day and night target value for street name signs. A large sign panel also improves a sign's ability to command attention at all ranges.

Contrast Ratio

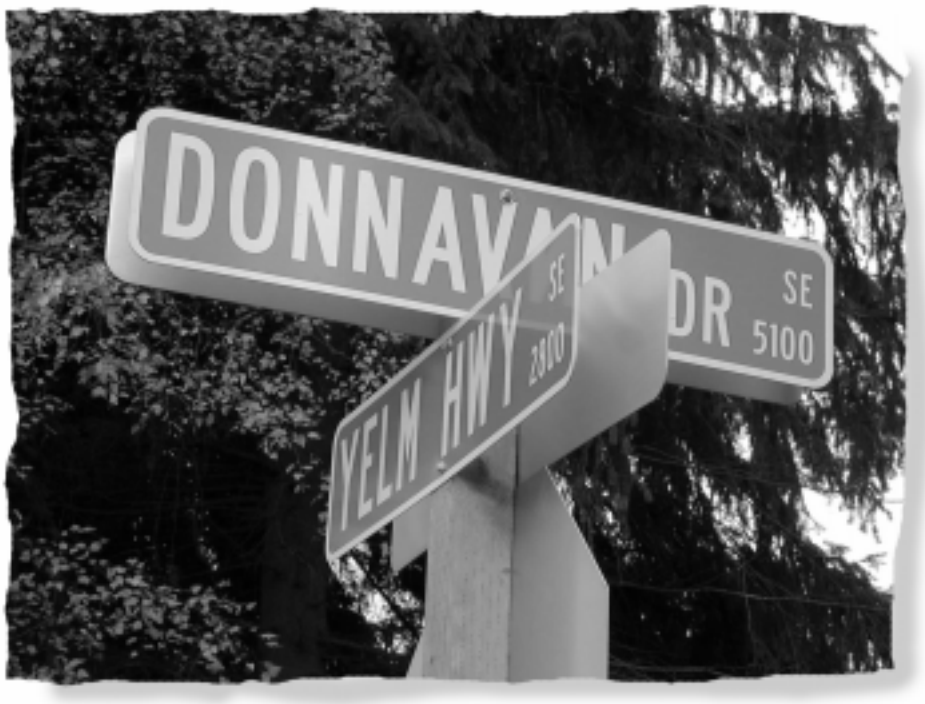
The contrast between a letter and the sign background is vital to obtaining high legibility. White letters on a green background provide good contrast day and night. The legibility of a sign is not greatly improved with contrast values exceeding 12:1.[1] Therefore, placing high-brightness letters on an overly dark background actually reduces the ease of a sign's detection (see Target Value) without improving the sign's legibility.

Letter Size

Drivers need sufficient time to detect, read and react to street name signs. A common rule of thumb in determining sign letter height is "one inch of letter height for each 40 to 50 feet of legibility distance." Typical driving speeds and sign approaches have shown that 6 inches of letter height or more is optimal for street name signs to be legible and usable by the driver. [2] The MUTCD now recommends a minimum of 6 inches on street name letter height.

Letter Spacing

Studies have shown that the legibility of signs is improved with increased spacing between letters. The FHWA letter spacing guidelines for guide signs can be applied to street name signs to improve their legibility.



Font/Stroke Width

FHWA standard Alphabet Series fonts B to E and E modified are recommended under the MUTCD. These fonts vary by stroke width and letter width from B (thinner) to E modified letters. Using upper and lower case letters in a sign generally provides better esthetics and readability than upper case letters alone.

Border

A street name sign's target value is improved by setting it off from its surroundings with a white border.

Reflectively

Over time, reflective sheeting loses its reflexivity. After as little as seven years, some street name signs can become virtually invisible at night. Sheetings should be selected that will maintain their brightness for a decade or more. Check product literature for specific warranties. With extremely high levels of initial luminance, these sheetings can lose a percentage of their brightness, yet remain conspicuous enough to be seen easily, day or night.

A pictorial symbol or graphic may be used to the left of the street name to identify the government jurisdiction. Visitors find this very useful, especially in heavily populated urban areas. Pictorials project a positive image of a proud and progressive community.

[1] Sivak & Olson, "Optimal and minimal Luminance Characteristics for Retroreflective Highway Signs

[2] Woods & Rowan, " Street Name Signs for Arterial Streets," 1970

Fall Conference Brings New Information and New Changes to NWPMA

By Dan Sunde, Director, WST2

October 9-11 marked the NWPMA 2000 Pavement Management Conference. Over one hundred pavement managers from across the Pacific Northwest met in Portland, Oregon to learn and share information to help them manage their pavement networks more effectively.

Two informative pre-conference workshops, sponsored by the Washington State and Oregon Technology Transfer Centers, were conducted covering the fundamentals of PMS and how to implement a system within an agency. Pat Lees of Nichols Consulting Engineers presented a training session on "How to be a PMS Champion" and Roger Smith of the Texas Transportation Institute provided an "Introduction to PMS".

Pat McDonnell, City Manager for the city of Vancouver, WA, provided the keynote along with Steve Mueller formerly of the Asphalt Institute and Larry Frostad, former chair of the NWPMA.

During the course of the conference it became apparent that several issues were hot items for the pavement managers. GASB 34 and its impacts on pavement inventories was high on the list. Another topic, integration of pavement management system information with a local agency's maintenance management system was another high priority. Impacts of utility cuts and methods to mediate the damage they cause to pavement performance was a continuing topic of discussion. An additional topic of interest to the pavement managers was the integration of GIS and GPS into pavement management systems.

An interesting presentation was made by Jeff Uhlmeyer, WSDOT Pavement Engineer, on a study being conducted by WSDOT's Materials Lab evaluating concrete intersections around Washington State. A final report is planned for distribution in a few months.

At the business meeting, the draft charter changes were ratified Idaho was brought into the NWPMA, and the E-Board membership was revised to reflect the tri-state composition. The old committee structure was replaced with up to three representatives from each state. A copy of the new charter can be found on the NWPMA web page at www.wsdot.wa.gov/ta/T2Center/Mgt.Systems/PavementTechnology/nwpma.html

After a successful year, Larry Frostad, Island County, WA, turned the gavel of NWPMA leadership over to Bill McEntire, of Clark County, WA. Bill was elected the new Chair of the E-board and once again Vicki Griffith, Skagit County, WA, was elected secretary. George Alton, Ada County, ID, and first Idaho board member, was elected vice chair by the E-Board.

A new training Committee was also created with Bill Whitcomb, city of Vancouver, WA voted as chair. Under Bill's leadership the committee will be working with the regional T2 Centers to develop a comprehensive training program for pavement management. ▲

Plan to attend the NWPMA Spring Conference

NWPMA's Spring Conference is planned for April 10-12, 2001 in Coeur d'Alene, ID. The E-Board is currently preparing the agenda. Topics already being considered include; case histories, successes and failures; the freeze-thaw cycle, how it impacts pavements; Nova chip technology; asphalt rejuvenators; and full depth reclamation. The E-board wants the conference to provide information that is valuable to you. If there are any topics or speakers you would like to have on the agenda please let a board member know.

WST2 Center is planning to have two pre-conference workshops again for the Spring Conference, one for new pavement managers and another for more experience managers. The basic workshop will include a half-day on the Small City Pavement Preservation Program and StreetWise, the paper-and-pencil PMS designed for small cities. If you would like to see a particular topic covered in the advanced workshop please contact Bob Brooks of the WST2 Center via e-mail at brookbo@wsdot.wa.gov or by phone at (360) 705-7352.

▲

Bill McEntire Awarded the NWPMA Pavement Manager of the Year Award

By Dan Sunde, Director WST2

Bill McEntire, Clark County, WA, was honored twice by his peers at the 2000 Pavement Management Conference. Not only was he elected the first Chair of the Association's Executive Committee for the new millennium, he was also awarded the Keith Kay Memorial Award as the outstanding pavement manager for 2000. The Keith Kay Award is named in memory of one of the early leaders in Washington pavement management. It is awarded each year to the pavement manager voted by his or her peers as the manager that has provided exemplary service and dedication in pavement management.

In his award statement, Chuck Greninger, Grays Harbor County, WA, lasts year's recipient, expressed his feelings this way:

"This year's winner will be an excellent representative for the Northwest Pavement Management Association. A familiar face for many years, this individual has been an inspiration to many of us, not only with his insight, but his ability to share with others his knowledge.

We know him as a fine, effective, dedicated, knowledgeable and well-respected individual, always willing to lend a helping hand…"

Congratulations, Bill, for a well-deserved award, and thank you for all the extra effort you've put into the Association! ▲

Deduct Matrix Review Committee Forming

One goal adopted by the E-board for this coming year is a thorough review and reworking of the deduct matrixes for pavement distresses. The E-board is currently looking for persons interested in participating in this effort. The first meeting to develop a work plan toward this goal will be scheduled soon. If this sounds like something you'd be interested in, please contact Bob Brooks at (360) 705-7352 or by e-mail at brookbo@wsdot.wa.gov. ▲

"Working Together for Better Pavements"

WORDS FROM THE CHAIR:

The Fall NWPMA Conference has come and gone and we are faced with a clean slate and a new year as an organization. Two things of real importance to the association occurred at the conference. First, we now have a revised charter that restructured the Executive Board. We have the ability to have three Board members from each state along with an elected Chair and Secretary / Treasurer. Our hope is better representation of all areas and participants. Second, and in my opinion the most exciting, is that we formalized a training committee to identify and develop programs that will benefit all members. Our hope is to provide training that will help each one of us to become more professional and knowledgeable in our endeavors within our home organizations.

The main challenge I see facing our organization for this coming year is an identity crisis. It has been decided that our normal fall conference will be held in conjunction with the Fifth International Conference on Managing Pavements being held in Seattle on August 11 -14, 2001. We are planning on having a short NWPMA business meeting sometime during the conference to allow us to elect the executive board for 2001 / 2002 and, of course, the new Chair and Secretary / Treasurer. Along with that we plan on having a presentation about who we are, where we come from and what we do. The total time for this is probably going to be no more than four hours. The rest of the time I am sure we will all be attending presentations by our counterparts from around the world.

Our challenge: how do we keep the group vital, intact and ready to face the challenges in 2002?

Due to the fact that our fall meeting is going to be about four hours long, here is our challenge: How do we keep the group vital, intact and ready to face the challenges in 2002? We are considering making the spring meeting in 2001 more along the lines of the normal fall meeting. The meeting is scheduled for the second week of April 9 - 13 in Coeur d'Alene, Idaho. Final dates and hotel location are yet to be determined. Please look forward to receiving these bits of information soon.

The Executive Board and the WST2 Center are hoping to have one and one-half days of classes in conjunction with the spring meeting. The total length of the meeting will probably be about three days. Topics are being determined at this time, not only for the classes but also for the spring meeting itself. If there are topics you would like to see, please contact any member of the Executive Board as soon as possible. We hope to have a final agenda in place soon.

It is very important to have chapter meetings as often as practical. If there hasn't been a chapter meeting in your area within the past six months, please contact the chapter chair and encourage him or her to have a meeting soon. If there is not a chapter near you, then consider forming one. Contact the Executive Board for information regarding chapters in your area. Our organization can only be as successful as each of us is willing to make it.

We have reviewed this year's conference critique sheets and generally had favorable feedback. One area many people felt we could improve on was advertising and having an agenda early. We hope to do a better job of that in the future, and we apologize for coming up short this year. The second trend identified is

many people feel it is time, once again, to move the location of the conference. Many people felt that a rotating east side - west side conference location is best. The Executive Board will be discussing this issue.

Other comments ranged from "I enjoyed meeting people who worked in my field, and enjoyed the informal exchange of ideas" to "I was disappointed that the ESA speaker was unable to attend." My personal favorite was "would like to stand and stretch every hour; seats get hard – butt gets numb – so does brain." Point well made.

As I indicated earlier, I feel that our biggest challenge as an organization is surviving this year. Budget cuts within our organizations can make it more difficult to attend conferences, and having such a small tract within the international conference can have negative effects on us. If we all work hard at holding chapter meetings and continue looking for and taking advantage of the training opportunities available, I feel we can continue to grow.

In closing, I would like to thank all those who attended this year's conference and all those who worked to bring it together. A very special thanks goes to Dan Sunde of the WST2 Center, Highways & Local Programs Service Center in the Washington State Department of Transportation for providing financial and staff support for this year's Fall Conference.

Sincerely,

Bill McEntire

Chairman

Parting Words from the 1999-2000 Chair

As the favorable construction weather ends, so does my term as chairman. I would like at this time to pass the baton to your new chairman Mr. Bill McEntire. I do this with sincere pleasure knowing that you have chosen a very qualified and dedicated person for this office. Bill's participation in our association's E-board for several years and his effectiveness as your vice chairman this past year has been very commendable. Please join me in welcoming Bill to the helm.

The year 2001 promises to be a very busy year for our association. The E-board will not only have their usual tasks to oversee but they also will be planning and conducting our annual fall conference in conjunction with the Fifth International Conference on Managing Pavements next August in Seattle.

Being your chairman for this past year has given me a great sense of appreciation for all the people who get involved and make this association a very unique learning experience.

I thank you all for allowing me to serve as your chairman.

Larry Frostad

NWPMA Chair-98-00

Island County

We've Changed Our Name,

But the Quality Remains the Same

In July 2000, the WQI Steering Committee evaluated past activities and future efforts. In order to strengthen WQI's focus on quality transportation, the steering committee agreed that a name change would be beneficial to emphasize WQI's:

- transition from the "initiative" phase to reflect an ongoing effort,
- advocacy for quality transportation,
- focus on facilitating partnerships, and the
- desire to keep the program alive and active.

To that end, the new name is **WASHINGTON PARTNERSHIPS FOR QUALITY TRANSPORTATION** (using the acronym **PQT**, pronounced "pact"). PQT was first introduced at the Pacific Northwest Transportation Technology Expo on September 12-14, 2000 at the Grant County Fairgrounds, Moses Lake, WA. At the Technology Expo, PQT and the Washington State Technology Transfer (WST2) Center cosponsored the "Better Mousetrap Award" to recognize those who develop better "mousetraps"; more efficient and quality oriented technology in transportation and maintenance operations.

Also as a joint venture with the WST2 Center, ***PQT News*** will be a regular section of the WST2 Bulletin. ***PQT News*** will include transportation related topics from city and county government agencies; local agency organizations (such as Association of Washington Cities (AWC), Washington State Association of Counties (WSAC), and County Road Administration Board (CRAB)), Washington State Department of Transportation (WSDOT), and PQT Steering Committee members. Information on upcoming PQT quality training sessions will also be included.

PQT News will feature a regular Question & Answer column to solicit and answer any questions you might have regarding PQT, quality tools, quality resources, etc. The PQT Steering Committee will use the ***PQT News*** to extend invitations to local agencies and other organization representatives to attend PQT Annual Steering Committee Meetings. These meetings will include discussion on possible improvement opportunities relating to our transportation system.

If you would like more information about the PQT, please contact:

Kimberly Colburn, PQT Coordinator, Highways & Local Programs

Washington State Department of Transportation
PO Box 47390
Olympia, WA 98504-7390

Phone: (360) 705-7879

FAX (360) 705-6822

colburk@wsdot.wa.gov
Or visit the Website at:
www.wsdot.wa.gov/wqi

▲

Secretary Slater Releases BTS Plan To Improve Transportation Safety Data

Source: http://www.bts.gov/PressReleases/PressReleaseSafetyData.html

U.S. Transportation Secretary Rodney E. Slater today released *Safety in Numbers: Using Statistics to Make the Transportation System Safer*, establishing the Bureau of Transportation Statistics (BTS) as the lead agency for improving the quality of transportation safety data, which will help raise the level of transportation safety.

"The actions to be taken based on the BTS Safety Data Action Plan are an important step toward improving safety—the top priority of the U.S. Department of Transportation and the top transportation priority for President Clinton and Vice President Gore," Secretary Slater said. "Accurate and timely data will give the entire transportation community the information to raise the level of safety by identifying, evaluating and reducing problem areas."

"By implementing this plan, we will provide the DOT and other transportation decision-makers with a new level of data quality," said Dr. Ashish Sen, BTS director. "Fact-based management of transportation safety programs can reduce the deaths and injuries that are a major cost in transportation."

Under the five-part plan:
BTS will be the lead agency for the DOT to improve safety data in coordination with the DOT Safety Council, which is an ongoing forum of DOT modal administrators and senior officials of the Office of the Secretary providing coordination and leadership on safety issues, as well as with data experts from each modal administration; an Intermodal Transportation Data Base (ITDB) will be created to organize safety data; BTS will develop data quality standards; the National Transportation Library will be expanded to provide more resources for transportation research; and DOT will conduct 10 research projects to focus on addressing specific shortcomings in transportation safety data.

> ***"Fact-based management of transportation safety programs can reduce the deaths and injuries that are a major cost in transportation."***
>
> ***Dr. Ashish Sen, BTS director***

BTS will continue to work with the transportation community on improving data quality through an implementation team of 20 stakeholders which will meet four times a year and issue progress reports on key issues, as well as conduct a conference every two years, with four regional conferences during the intervening years.

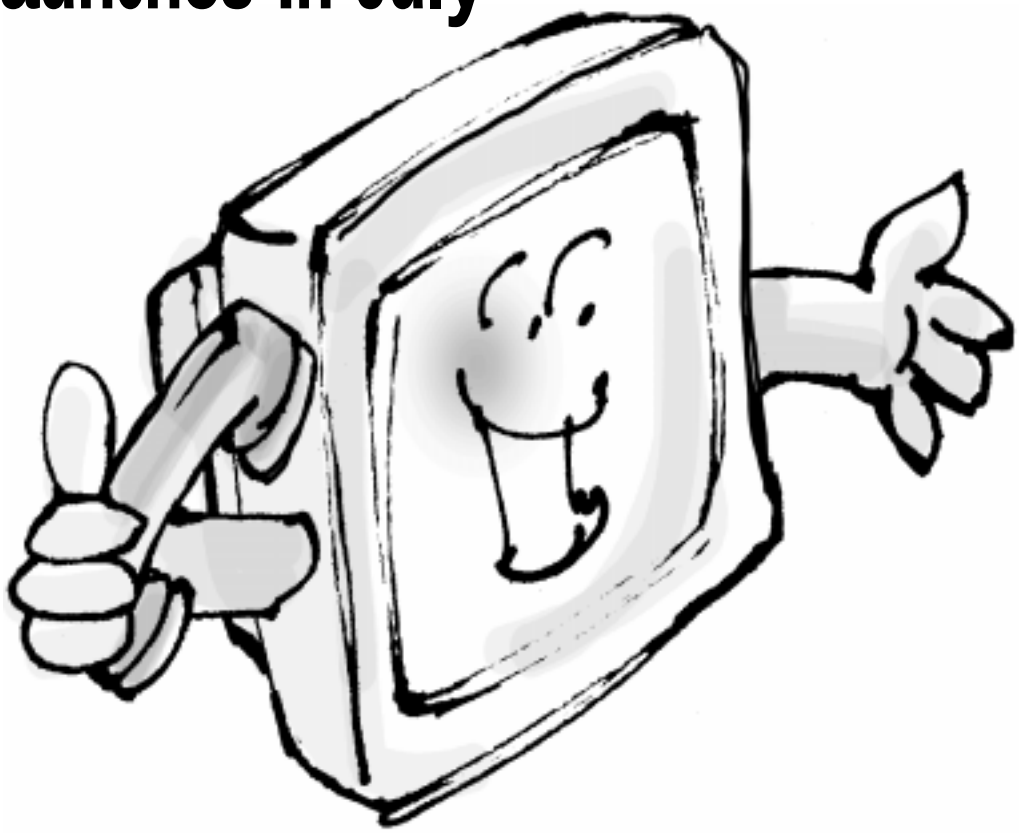
The final version of the Safety Data Action plan followed the "Safety in Numbers" conference earlier this year involving more than 2,000 of the nation's key transportation stakeholders. Four Safety Data Workshops held in 1999 with about 200 stakeholders helped formulate the initial Action Plan. This plan was developed in response to Secretary Slater's 1999 National Transportation Safety Conference where stakeholders identified better data collection and reporting across all jurisdictions as one of the top priorities for improving safety. Also, BTS in 1998 issued "Transportation Statistics Beyond ISTEA: Critical Gaps and Strategic Responses," citing the need for better quality safety data.

The full *Safety Data Action Plan*, *Safety in Numbers: Using Statistics to Make the Transportation System Safer*, can be found at the BTS website: www.bts.gov

For further information contact:
David Smallen
Phone: 202-366-5568
BTS 12-00 ▲

Washington Surplus Equipment Auction Launches in July

Partnership First of Its Kind to Link a Non-Profit Organization, Public Agencies and Private Internet Company



Los Angeles, California – July 2000 – Public agencies in the state of Washington can now leverage the power of the Internet to purchase and sell surplus equipment with each other– thanks to a unique new partnership between eCitydeals, an online e-government business portal, and Washington's Good Government Group, a non-profit with the goal of restoring civic pride in Washington State.

Under the terms of the agreement, eCitydeals will arrange for special auctions between Washington government agencies, and the Good Government Group will work exclusively with eCitydeals to ensure public agencies in Washington are aware of the service. The Good Government Group will receive a portion of the transaction fees from online auctions conducted by Washington cities using eCitydeals.

"One objective of the Good Government Group is to help governments improve effectiveness through the utilization of technology," said Faith Trimble, Executive Director, Good Government Group. "We believe our partnership with eCitydeals will further that objective, while also creating a funding stream that enhances our ability to improve citizen-government relations in the state. In addition, staff at eCitydeals consists of former mayors and city managers who know and understand government, and are willing to be flexible. They have been great to work with."

"One objective of the Good Government Group is to help governments improve effectiveness through the utilization of technology"

Faith Trimble, Executive Director, Good Government Group.

"eCitydeals is the perfect solution for cities and public agencies looking to leverage the power of the Internet to conduct business online," said Larry Kosmont, CEO, eCitydeals. "This partnership with Good Government Group will allow Washington cities to move strategically and immediately online, and is a portent for the future of eCitydeals.

We anticipate more cities will use the eCitydeals.com portal to conduct online business."

Hundreds of Items from Washington Cities Ready to be Auctioned

Several Washington public agencies are ready to take advantage of the eCitydeals - Good Government Group partnership. Seattle, for example, has indicated they could provide as many as 100 items for auction on eCitydeals. The state of Washington, King County and the city of Renton have also indicated an interest in listing items for auctions.

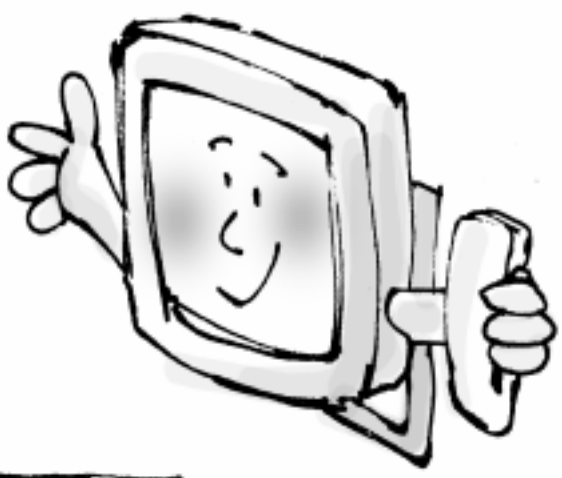
Auctions will be available solely to Washington public agencies for 30 days, or other limited time period. What doesn't sell between Washington governments will be auctioned nationally. Bidders in the auction participate at no cost. A 3 percent transaction fee is charged to sellers.

The Washington auction is supported by the Association of Washington Cities, the Washington State Association of Counties, the Washington State School Directors Association and the Municipal Research and Services Center.

"The real winners in the partnership between eCitydeals and Good Government Group are the cities and public agencies in Washington," said Jim Justin, Assistant Director of Operations, Association of Washington Cities. "We are very pleased with the opportunities eCitydeals provides cities to be more productive and to spend efficiently."

About eCitydeals

eCitydeals is a business-to-business Internet company that creates an online marketplace for cities and public agencies to conduct their business with the private sector in an easy, cost-effective way. The Web site, eCitydeals.com, is a vertical portal where public agencies can purchase and sell supplies and auction equipment, locate qualified professional services firms, advertise a competitive public works project bid, or simply promote their community to the private sector by advertising economic and redevelopment opportunities.



For business professionals in the private sector, eCitydeals provides a unique and easy way to break through the bureaucracy of governments. Using eCitydeals.com, developers and professional service firms can access all the information they need on contracting with the government.

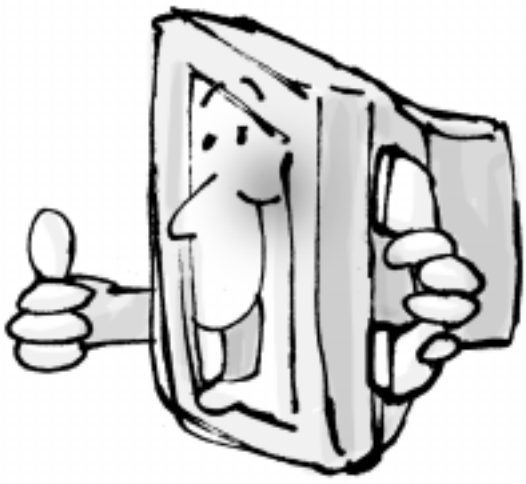
Founded in 1999, eCitydeals is headquartered in Los Angeles.

About Good Government Group

Good Government Group is a new, non-profit organization with the goal of restoring civic pride in Washington State. Leaders in state and local government started the Good Government Group to collaboratively implement statewide programs that improve the relationship between Washington's government and its citizens, and develop strategies that increase public confidence in government. The objectives of the non-profit are to help increase government effectiveness through partnerships and technology; enhance citizen knowledge of government; and help governments change operations that are perceived negatively by citizens.

For more information on how to buy or sell equipment in the Washington Surplus Equipment Auction, contact :

Dominick Rappa:
eCitydeals:
213-623-8484 x204 or
drappa@ecitydeals.com. ▲



Helpful Tips and Resources from the WSDOT Library

Claudia Devlin, WSDOT Librarian

DECISION SCIENCES WEB

Elsevier, a respected publisher, has developed a searchable database titled, "The Decision Sciences Web." It is a database on Decision Sciences, Operations Research, and Management Science journals. It offers a fully searchable archive of abstracts that are updated weekly.

Examples of publications included in the database are:

- Information and Management
- Journal of Operations Management
- Socio-Economic Planning Sciences
- Transportation Research B: Methodological
- Transportation Research E: Logistics
- Handbooks in Operations Research and Management Science

Tables of Contents and abstracts can be searched free of charge and without registration. Since the Washington State Department of Transportation does not subscribe to these publications, full text is not available online. However, the Library can obtain full text articles for you by requesting them through an interlibrary loan.

Decision Sciences Web: www.elsevier.com/locate/dsw.

WSDOT Library: www.wsdot.wa.gov//hq/library/
P.O. Box 47425
310 Maple Park Ave. S.E.
Olympia, WA 98504-7425
Phone: (360) 705-7750
Fax: (360) 705-6831

PART 5 CHECKLIST READY FOR USE

Brian Hasselbach, Environmental Engineer, Highways & Local Programs Service Center

Since the March 1999 listings of a number of salmonid species, Washington State Department of Transportation's (WSDOT) Highways and Local Programs Service Center (H&LP) has been involved in a number of different efforts to develop new guidance, direction, and tools to streamline the Endangered Species Act's Section 7 consultation process.

One of those early efforts was the development of a Biological Assessment Checklist, which is Part 5 of the Local Agency Environmental Classification Summary. This form is found in Section 24 of the Local Agency Guidelines. The checklist was developed in cooperation with WSDOT's Environmental Affairs Office, Federal Highway Administration (FHWA), National Marine Fisheries Service (NMFS), and United States Fish and Wildlife Service (USFWS). The intent of the checklist is to serve as the documentation for no-effects projects, thus reducing the amount of work and preparation that is quickly becoming commonplace to produce a lengthy no-effects Biological Assessment (BA) documentation.

As the checklist was utilized by local agencies, H&LP quickly realized that it was far too restrictive and was not applicable for a number of projects, all of which were no-effects projects. Revising the checklist was a main focus of a Process Improvement Team that met in February of this year. Thanks to the work and reviews by the Services, the revised checklist has been completed and is now available for use, effective immediately.

The checklist will be included in the upcoming LAG manual updates, but is also available on the WSDOT Highways and Local Programs' Web page at http://www.wsdot.wa.gov/TA/Operations/LAG/LAGHP.HTM

If you have any questions concerning the checklist and its development, please contact Brian Hasselbach, WSDOT H&LP Environmental Engineer, at (360) 705-6975 or hasselb@wsdot.wa.gov

NORTHWEST TRANSPORTATION TRAINING AND EDUCATION ALLIANCE

By Jim McManus, PE, TRANSPEED Director,
University of Washington

A new northwest education and training partnership in transportation engineering was launched early in 2000. Discussions about the partnership began early in 1999 between the University of Washington, University of Idaho, Idaho Transportation Department, Idaho Technology Transfer Center and Washington State Technology Transfer Center. Discussions continued between the universities at the TRANSNOW Conference at the University of Washington held in July 1999.

The early discussions and conclusions reached at the TRANSNOW Conference breakout sessions verified the need for a regional partnership concept. Prior to the conference, discussions had been underway between Michael Kyte from the University of Idaho, Kate Hunter-Zaworski from Oregon State University, and Jim McManus of the University of Washington about a regional need for lifelong learning (L^3) in transportation engineering. Under the leadership of Michael Kyte, the initial meeting of the group took place at the conclusion of the "Road Builders Conference" in Coeur d'Alene in early March, 2000. Subsequent meetings have been held in Post Falls, Idaho in June and at Boise in August.

The charter drafted by the group envisions establishing an alliance of transportation organizations and educational institutions to broaden education and life long learning (L^3) opportunities for the transportation industry and professional transportation practitioners of the Northwest. The group further envisioned a purpose and mission to provide accessible training and education for all levels of the transportation workforce by coordinating the development of training and education programs, leveraging training and education resources, and sharing training and education information through a collaborative effort.

NWTTA membership includes representatives from DOT Engineering / Staff Development Offices, State and Tribal LTAP / T2 Centers, University and College level transportation engineering professional development programs, and FHWA Division representatives. The States represented include Alaska, Idaho, Montana, Oregon and Washington.

Goals established by this group include:

- Provide a continuum of career development training and education opportunities for all levels of transportation professionals and paraprofessionals in the state, local, tribal, federal, and private sectors.
- Improve the ability of the members to maximize the number of career development training and education opportunities for transportation personnel within NWTTA and tribal regions and maximize efficiency by leveraging resources and course offerings where possible.
- Coordinate locations of NWTTA career development training and education course offerings to allow migration of students across state boundaries and work toward reciprocity of career development credits between states and individual programs.
- Maximize information sharing, promote collaboration and foster mutually beneficial relationships among NWTTA members.
- Support and encourage innovative training and education delivery methods and models including various distance learning techniques.
- Consider the new educational paradigms that provide for university level credit through extended professional development and certificate programs granted by cooperating northwest Universities and related educational providers.
- Seek the support and endorsement of public and private transportation organizations and agencies to recognize and provide incentives for participants in the NWTTA professional development programs.

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www.wsdot.wa.gov/TA/T2Center/T2PUBS.htm

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- ❑ 1999 Audio Visual Catalog, WST2 Center
- ❑ Asphalt Seal Coats, WST2 Center (1999 Reprint)
- ❑ Building on the Past, Traveling to the Future: A Preservationist's Guide to the ISTEA Transportation Enhancement Provision, FHWA
- ❑ Comparison of Three Compactors Used in Pothole Repair, CRREL, 1984
- ❑ Contracting for Professional Services in Washington State, MRSC, 1994
- ❑ Engineer's Pothole Repair Guide, US Army Corps of Engineers, CRREL, 1984
- ❑ Evaluation of Automated Pavement Distress Data Collection Procedures for Local Agency Pavement Management, Texas A&M, WSDOT, ODOT, 1996
- ❑ Family Emergency Preparedness Plan, American Red Cross, etal.
- ❑ Field guide for Unpaved Rural Roads
- ❑ Financing Federal Highways, FHWA, 1999.
- ❑ Fish Passage through Culverts, FHWA, USDA, 1998
- ❑ Fly Ash Facts for Highway Engineers, FHWA July 1986
- ❑ Geotextile Selection and Installation Manual for Rural Unpaved Roads, FHWA - 1989
- ❑ Getting People Walking: Municipal Strategies to Increase Pedestrian Travel, Rhys Roth, Energy Outreach Center
- ❑ Gravel Road Test Sections Insulated with Scrap Tire Chips, CRREL 1994
- ❑ A Guide to the Federal-Aid Highway Emergency Relief Program, USDOT, June 1995
- ❑ A Guide for Local Agency Pavement Managers, NWT2 Center, 1994
- ❑ A Guidebook for Residential Traffic Management, NWT2 Center, 1994
- ❑ A Guidebook for Student Pedestrian Safety, KJS, 1996
- ❑ A Guide for Erecting Mailboxes on Highways, AASHTO, 1984
- ❑ Highway/Utility Guide, FHWA 1993
- ❑ Impact of Excavation on San Francisco Streets, September 1998
- ❑ Improving Conditions for Bicycling and Walking, FHWA, 1998
- ❑ Improving Highway Safety at Bridges on Local Roads and Streets, 1998
- ❑ Innovative Materials Development and Testing Volume 2: Pothole Repair, SHRP, NRC, 1993
- ❑ International State-of-the-Art Colloquium on Low-Temperature Asphalt Pavement Cracking, CRREL, 1991
- ❑ Local Agency Safety Management System, WSDOT, 1998, Reprinted 2000
- ❑ Local Low Volume Roads and Streets, ASCE, 1992
- ❑ Maintenance of Aggregate and Earth Roads, WST2 Center (1994 reprint)
- ❑ Manual of Practice for an Effective Anti-icing Program: A Guide for Highway Winter Maintenance Personnel, FHWA, 1996
- ❑ New Generation of Snow and Ice Control, FHWA
- ❑ Pavement Surface Condition Field Rating Manual for Asphalt Pavement, NWPMA, WSDOT. 1999
- ❑ Problems Associated with Gravel Roads, FHWA, 1998
- ❑ Pedestrian Facilities Guidebook, WSDOT ($12.00 + postage outside Washington State) 1997

- ❑ Pothole Primer – A Public Administrator's Guide, CRREL, 1989
- ❑ Rating Unsurfaced Roads, a Field Manual for Measuring Maintenance Problems, CRREL
- ❑ Recommendations to Reduce Pedestrian Collisions, WSDOT, December 1999
- ❑ Redevelopment for Livable Communities, Rhys Roth, Energy Outreach Center, 1995
- ❑ Scrap Tire Utilization Technologies, NAPA, 1993
- ❑ Sidewalk Details, WST2, 2000
- ❑ Snow Fence Guide, NRC, 1991
- ❑ State-of-the-Art Survey of Flexible Pavement Crack Sealing Procedures in the United States, CRREL, 1992
- ❑ Superpave System – New Tools for Designing and Building More Durable Asphalt Pavements, FHWA
- ❑ Technology Information At Your Fingertips, A Directory of Information Resources for Improving Transportation Technology - FHWA
- ❑ Traffic Calming: A Guide to Street Sharing, Michael J. Wallwork, PE, 1993
- ❑ Unsurfaced Road Maintenance Management, CRREL, 1992
- ❑ Use of Scrap Rubber in Asphalt Pavement Surfaces, CRREL 91-27
- ❑ Utility Cuts in Paved Roads, Field Guide, FHWA, 1997
- ❑ W-Beam Guardrail Repair and Maintenance, FHWA

Workbooks and Handouts from WST2 Center Workshops

- ❑ Access Management Guidelines for Activity Centers, NCHRP Report 348, TRB / NRC, 1992
- ❑ Flagging Handbook, ATSSA, 1999
- ❑ Handbook for Walkable Communities, by Dan Burden and Michael Wallwork
- ❑ Highway Maintenance Welding Techniques and Applications, Tom Cook, Cornell Local Roads Program, 1995
- ❑ Historic and Archeological Preservation: An Orientation Guide, FHWA / NHI
- ❑ Planning and Implementing Pedestrian Facilities in Suburban and Developing Rural Areas, TRB
- ❑ Part Vl Standards and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility, and Incident Management Operations (MUTCD) FHWA, September 3,1993
- ❑ Pavement Maintenance Effectiveness / Innovative Materials Workshop Participant's Handbook
- ❑ Snow & Ice Control Chemicals, Theory & Practice, Dale G. Keep, Ice & Snow Technologies, LLC,
- ❑ Transit Manager Toolkit, TRB, NRC
- ❑ Quality Standards for Work Zone Traffic Control Devices, ATSSA, 1993

Noncredit Self-Study Guides

These noncredit self-study guides are available through WSDOT Staff Development, and may be obtained from the WST2 Center. An invoice will be sent with these noncredit course materials.

- ❑ Basic Surveying, $20
- ❑ Advanced Surveying, $20
- ❑ Contract Plans Reading, $25
- ❑ Technical Mathematics l, $20
- ❑ Technical Mathematics ll, $20
- ❑ Basic Metric System, $20

Computer Programs

The following computer programs may be downloaded from the Internet at: *www.wsdot.wa.gov/TA/Operations/Environmental/Soft.htm*

- **HyperCalc**. A shareware utility for converting between metric and English units
- **APWA Cad Symbol Standards and Menus**. A public domain program of standard AutoCAD symbols developed by the Washington Chapter of APWA for use with AutoCAD release 12.
- **FWD Area Program**. This program is useful in calculating Normalized Deflections Area Value, and Subgrade Moduli from FWD Data.
- **STIP Too Application** (version 3.3) State Transportation Improvement Program. This program enables you to manage your 6-year TIP and send it for inclusion in the STIP (Statewide Transportation Improvement Program). Written in Filemaker Pro 4.1.

To register for a class, contact the training provider listed in the box preceding each section. For additional training needs, contact the Washington State T2 Center.

Washington State T2 Center
Contact Laurel Gray or Wendy Schmidt
(360) 705-7386, fax (360) 705-6858
http://www.wsdot.wa.gov/TA/T2Center/train2.htm

To register for a class in this section use the contact listed above.

Applications of Geographic Information Systems for Transportation (NHI)
January 9-11, 2001; Sprinker Recreation Center, Tacoma. **$225.**
The course provides an overview of GIS-T and current state of practice at the federal, state, and local levels. Covered will be fundamentals of GIS-T, costs and benefits, implementation, street network files, data layering and cartographic, spatial database management, Linear Referencing System, and developmental framework for GIS.

ESA 401: Advanced Biological Assessments
February 15, Olympia, February 22, Lynnwood.

Bridge Condition Inspection Update (BCIU)
February 6-7, WSDOT Maintenance Facility, Tacoma; February 20-21, Hal Holmes Community Center, Ellensburg. ***Free.***

Bridge Condition Inspection Fundamentals (BCIF)
February 13-15, Transmission Building, Tacoma. ***$150*** *for anyone not a Washington state, county, city or other municipal employee. If a person takes the BCIF and the BCIT in the same year the $150 will cover both.*

Bridge Condition Inspection Training (BCIT)
March 5-9 and March 19-23, Lacey Community Center, Lacey. ***$150*** *for anyone not a Washington state, county, city or other municipal employee. If a person takes the BCIF and the BCIT in the same year the $150 will cover both.*

Geosynthetics Engineering Workshop (NHI)
March 6-8, 2001; Green River Community College, Auburn. ***$225.***
This course provides training on the correct and cost-effective utilization of Geosynthetics in transportation applications.

Techniques for Pavement Rehabilitation (NHI)
March 12-15, 2001, Seattle

Plans, Specifications and Estimate Preparation (PS&E)
(includes Contract Special Provision Writing) Dates are tentative: March 14-15, Tumwater; April 18-19; Moses Lake, May 2-3, Seattle. ***$40/80.***
This course covers the most recent requirements for preparing complete, biddable, constructible, and defensible plans, and the most recent requirements for writing complete, concise, and well-formatted special provisions.

The Basics of a Good Gravel Road
Tentatively scheduled for May 8, Tri-Cities; May 10, Moses Lake; May 15, Lacey; May 17, Everett. Bill Heiden, Instructor. ***$35/70.***
Traffic wear patterns; proper shape, centerline, cross slope, roadway edges and roadside intimidation; good surface materials, how soils work and what is needed for a lasting road; dust palliatives / base stabilizers, equipment and methods to maintain a good gravel road; suggested sequences and specifications of good gravel road maintenance.

Endangered Species Act Training Program
Coming this winter / spring:

ESA 101: For Executives and Management
ESA 101: For Maintenance Crews
ESA 101: For Technical Staff
Courses are in development at the University of Washington and are targeting the needs of road maintenance as it applies to the Endangered Species Act and 4(d) coverage. Additional courses include: Best Management Practices, Biological Units, and Design. All period six courses will be completed by June, 2001 ESA 101: for Executives and Management is due for completion in early 2001.

Information will be posted to the WST2 web site as it becomes available.

Associated General Contractors of Washington
Contact David Hymel
(206) 284-4500, fax (206) 284-4595
http://www.agcwa.com

To register for a class in this category use the contact listed above.

The AGC has a wide variety of classes available in supervisory training, management skills and construction technical skills. See their web site for details and schedule.

Construction Site Erosion and Sediment Control Certification Course - $159
January 10-11, Vancouver; January 24-25, Kent; February 7-8, Olympia; February 21-22, Seattle; March 7-8, Moses Lake; March 21-22, Yakima; April 4-5, Seattle; April 18-19, Tacoma; May 9-10, Shoreline; May 16-17, Seattle.
This is the same course previously taught by WSDOT. Classes can be presented for individual agencies.

John Ostrowski
Management Consultant
(360) 573-7594
ostrowj@pacifier.com

To register for a class in this category use the contact listed above.

Public Works Administrator Training Program
February 21-23, 2001, Issaquah Holiday Inn, Issaquah. ***$310.***
Learn what it takes to be a public works administrator. Develop new skills and learn how to use some new tools to help you do your job with more satisfaction. Cosponsored by APWA Washington Chapter, City Engineer's Association of Washington and Washington State Public Works Board. Instructors: John Ostrowski, Jack Pittis, and Pete Butkus.

TRANSPEED
University of Washington
Contact Christy Roop
(206) 543-5539, fax (206) 543-2352
http://www.engr.washington.edu/epp

To register for a class in this section use the contact listed above.

Basic Roadway Geometric Design
January 17-19, Seattle. $265/465.

The following courses will be scheduled in the next several months. Dates and locations are to be determined.
Contact Christy Roop for further information.

- **Hydrology and Basic Hydraulics**
- **Roadway Culvert Hydraulics Design**
- **Storm Water Engineering for Transportation Engineers**
- **Culvert Repair and Rehabilitation**
- **Advanced Roadway Geometric Design**
- **Public Works Construction Project Management**
- **Construction Inspection of Public Works Projects**
- **Roadway Value Engineering**
- **Highway Capacity Manual 2000**
- **Legal Liability for Transportation Professionals**
- **Design of Retaining Walls and Other Structures**
- **Access Management**
- **Advanced Highway Capacity Analysis**
- **Traffic Simulation and Modeling**
- **Design and Calculation of Earthwork**
- **Concrete Bridge Design**

University of Washington
Professional Engineering Practice Liaison (PEPL) Program
Contact Stephanie Strom
(206) 543-5539, fax (206) 543-2352
http://www.engr.washington.edu/epp

To register for a class in this category use the contact listed above.

Stormwater Treatment: Chemical, Biological and Engineering Principles
January 24-25, February 8-9, Vancouver. $495/525

Alternative On-Site Stormwater Management Techniques
March 20-21, Seattle.

University of Washington Engineering Professional Programs (EPP)

Contact Emily West

(206) 543-5539, fax (206) 543-2352

http://www.engr.washington.edu/epp

To register for a class in this category use the contact listed above.

Cold Regions Engineering Short Course
January 4-8, Seattle. Three CEUs. $1,095.

Drilling and Blasting Techniques for Construction and Quarrying
February 5-9, Seattle. $1199/1299.

Fleet and Shop Management Classes
Registration for the following 3 classes:
$349 each session if you register on or before March 5.
$640 for 2 sessions if you register on or before March 5.
$795 for 3 sessions if you register on or before March 5.
Add $100 to fees above if registering after March 5.

Fleet Facility Maintenance and Design
March 22.

Vehicle Fleet Management
March 23.

Effective Shop Management
March 24.

Engineering Exam Prep Courses:

Fundamentals/Engineer-in-Training Refresher
February 2-April 2, Seattle. Monday and Wednesday, 6:30-9:00 pm. ***$325/465****.*

Mechanical Engineering Refresher
February 13-March 3, Seattle. Tuesday and Thursday, 6:30-9:00 pm. ***$525/595.***

Civil Engineering Refresher
March 1-April 5, Seattle. Tuesday and Thursday, 7:00-9:30 pm. ***$445/515.***

Conferences and Meetings

Northwest Concrete Pavement Seminar
March 5-6, 2001, Coeur d'Alene, ID.
Contact Washington State University at 1-800-942-4978.

52 Annual Road Builders' Clinic
March 6-8, 2001, Coeur d'Alene, ID
Contact Washington State University at 1-800-942-4978.

Vehicle Maintenance Management Conference
March 19-22, 2001, University of Washington campus, Seattle. Contact Engineering Professional Programs at (206) 543-5539 for further information.

Society for Ecological Restoration Northwest Chapter Conference
"Beyond Good Intentions"
April 2-6, 2001, Seattle. Contact UW Engineering Professional Programs at (206) 543-5539 for further information.

NWPMA Spring Conference
April 10-12, 2001, Coeur d'Alene, ID Contact Bob Brooks at (360) 705-7352

APWA Spring Conference
April 17-20, 2001, Everett. Contact Ted Thetford at (425) 257-8824.

Fifth International Conference on Managing Pavements
August 11-14, 2001, Seattle. For more information contact University of Washington at (206) 543-5539.

11th Northwest On-Site Wastewater Treatment Short Course and Equipment Exhibition
September 17-18, 2001. Contact the University of Washington's Engineering Professional Programs at (206) 543-5539 for further information.

APWA Fall Conference
October 16-19, 2001, Walla Walla. Contact Dick McKinley at (509) 527-4463.

Washington State Technology Transfer Center

WASHINGTON STATE T2 STAFF

Daniel L. Sunde
WST2 Director
SundeD@wsdot.wa.gov
(360) 705-7390

Roger Chappell
Technology Integration Specialist
ChappeR@wsdot.wa.gov
(360) 705-7539

Laurel Gray
Training Coordinator
GrayL@wsdot.wa.gov
(360) 705-7355

Bob Brooks
Pavement Technology Engineer
BrookBo@wsdot.wa.gov
(360) 705-7352

David Sorensen
Traffic Technology Engineer
SorensD@wsdot.wa.gov
(360) 705-7385

Wendy Schmidt
WST2 Assistant
SchmidW@wsdot.wa.gov
(360) 705-7386

John Easley
Road Show Trainer
(360)-705-7386

Fax
(360) 705-6858

WST2 Web Site
www.wsdot.wa.gov/TA/T2Center/T2hp.htm

Toll Free Training Number
1-800-973-4496

WASHINGTON STATE T2 ADVISORY COMMITTEE

Phil Barto, Chairman
Maintenance Engineer
Spokane County
(509) 477-7429

Gary Armstrong
Public Works Director
City of Snoqualmie
(425) 888-1555

Joe Bonga
Road Construction/Maintenance
Bureau of Indian Affairs
(503) 231-6712

Mike Deason
Public Works Director
City of Leavenworth
(509) 548-5275

Randy Hart
Grants Program Engineer
County Road Administration Board
(360) 586-7586

Marjorie Hutchinson
South Zone Engineer
Naches Ranger Station, USFS
(509) 653-2205 ext. 261

Will Kinne
Road Operations Manager
Pierce County
(253) 798-2953

Jack Manicke
Road Maintenance Specialist
WSDOT/FOSSC
(360) 705-7852

Phil Meyer
Maintenance Coordinator
Whitman County/EWCRS
(509) 397-6209

Walt Olsen
County Engineer
Pend Oreille County
(509) 447-4513

Craig Olson
Government Services Manager
ENTRANCO/APWA
(360) 709-0301

Tom Rountree
Supervisor
King County DOT/RSD
(206) 296-8100

Jim Seitz
Transportation Specialist
Association of Washington Cities

EXOFFICIO MEMBERS

Ovidiu Cretu
Manager Technical/Professional Programs
WSDOT Staff Development
(360) 705-7066

Kathy Lindquist
Research Implementation Manager
WSDOT Research Office
(360) 705-7976

Cathy Nicholas
Pavement Engineer &
T2 Coordinator, FHWA
(360) 753-9412

Richard Rolland
Director
NW Tribal LTAP
(509) 358-2225

Washington State Technology Transfer Center
WSDOT-H&LP Service Center
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